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## Claims

1. A changer-type recording medium playback device, characterized in being provided with:

a recording medium holding means that holds a large number of recording mediums on which music signals are recorded,

a recording medium playback means that plays the recording mediums and outputs music signals,

an exchange means that takes the desired recording medium from the recording medium holding means and places it in the recording medium playback means, and that returns a recording medium placed in the recording medium playback means to the recording medium holding means,

a recording medium guide information memory means that stores text information associated with the recorded content on the recording mediums and a part of the music signals recorded on the recording mediums correlated to the recording mediums, separately from the recording mediums held in the recording medium holding means,

a display means that displays text information,

and a playback control means that, during searching of the recording mediums, displays as a list, or switches the display of, on the display means, the text information registered correlated to each recording medium in the recording medium guide information memory means; that reads and outputs the desired text information and the music signals correlated to the same recording medium from the recording medium guide information memory means, when a user selects said text information corresponding to a desired recording medium from said display; and that controls the exchange means to take the recording medium correlated to said desired text information from the recording medium holding means and to place it in the recording medium playback means, and then controls the recording medium playback means to provide playback, when the user designates playback.

2. The changer-type recording medium playback device described in Claim 1, characterized in that

the text information associated with the recorded content on the recording mediums includes the title of the recording mediums.

3. A changer-type recording medium playback device, characterized in being provided with:

a recording medium holding means that holds a large number of recording mediums on which music signals are recorded,

a recording medium playback means that plays the recording mediums and outputs music signals,

an exchange means that takes the desired recording medium from the recording medium holding means and places it in the recording medium playback means, and that returns a recording medium placed in the recording medium playback means to the recording medium holding means,

a recording medium guide information memory means that correlates and stores the recording medium title and genre, and a part of the music signals recorded on the recording mediums, correlated to the recording mediums and separately from the recording mediums held in the recording medium holding means,

a display means that displays titles,

a searched genre input means to input a searched genre,

and a playback control means that, during searching of the recording mediums, displays as a list, or switches the display of, on the display means, the titles corresponding to the desired genre, from the titles registered correlated to the individual recording mediums in the recording medium guide information memory means, according to the desired genre input by the searched genre input means; that reads and outputs the music signals correlated to the same recording medium as the desired title from the recording medium guide information memory means, when a user selects said desired title from said display; and that controls the exchange means to take the recording medium correlated to said desired title from the recording medium holding means and place it in the recording medium playback means, and then controls the recording medium playback means to provide playback, when the user designates playback.

4. A changer-type recording medium playback device, characterized in being provided with:

a recording medium holding means that holds a large number of recording mediums on which music signals are recorded,

a recording medium playback means that plays the recording mediums and outputs music signals,

an exchange means that takes the desired recording medium from the recording medium holding means and places it in the recording medium playback means, and that returns a recording medium placed in the recording medium playback means to the recording medium holding means,

a recording medium guide information memory means that stores the recording medium title and artist name, and a part of the music signals recorded on the recording mediums, correlated to the recording mediums and separately from the recording mediums held in the recording medium holding means,

a display means that displays titles,

a searched artist name input means to input a searched artist name,

and a playback control means that, during searching of the recording mediums, displays as a list, or switches the display of, on the display means, the titles corresponding to the desired artist name, from the titles registered correlated to the individual recording mediums in the recording medium guide information memory means, according to the desired artist name input by the searched artist name input means; that reads and outputs the music signals correlated to the same recording medium as the desired title from the recording medium guide information memory means, when a user selects said desired title from said display; and that controls the exchange means to take the recording medium correlated to said desired title from the recording medium holding means and place it in the recording medium playback means, and then controls the recording medium playback means to provide playback, when the user designates playback.

5. A changer-type recording medium playback device, characterized in being provided with:

a recording medium holding means that holds a large number of recording mediums on which music signals are recorded,

a recording medium playback means that plays the recording mediums and outputs music signals,

an exchange means that takes the desired recording medium from the recording medium holding means and places it in the recording medium playback means, and that returns a recording medium placed in the recording medium playback means to the recording medium holding means,

a recording medium guide information memory means that can store text information associated with the recorded content of the recording mediums and a part of the music signals recorded on the recording medium correlated to the recording mediums, separately from the recording mediums held in the recording medium holding means,

an input means to input text information associated with the recorded content on a certain desired recording medium,

a recording medium guide text information registration means that stores in the recording medium guide information memory means correlated to said certain desired recording medium, when text information associated with the recorded content on a certain desired recording medium is input by the input means,

a music signal registration designation means that designates registration of the music signal recorded on a certain desired recording medium,

a recording medium guide music signal registration means that, when registration of the music signal recorded on a certain desired recording medium is designated by the music signal [registration] designating means, and after the exchange means is controlled to remove said certain desired recording medium from the recording medium holding means and place it in the

recording medium playback means, controls the recording medium playback means and stores the music signal played back from a specific portion of the recording medium, or from a certain portion designated by a user, correlated to said certain desired recording medium in the recording medium guide information memory means,

a display means that displays text information,

and a playback control means that, during searching of the recording mediums, displays as a list, or switches the display of, on the display means, text information registered correlated to each recording medium in the recording medium guide information memory means; that reads and outputs the music signal correlated to the same recording medium as the desired text information from the recording medium guide information memory means, when said text information corresponding to the desired recording medium is selected by a user from said display; and that controls the exchange means to take the recording medium correlated to said desired text information from the recording medium holding means and place it in the recording medium playback means, and then controls the recording medium playback means to provide playback, when the user designates playback.

6. The changer-type recording medium playback device described in Claim 5, characterized in that

the text information associated with the recorded content on the recording mediums is the title.

7. A changer-type recording medium playback device, characterized in being provided with:

a recording medium holding means that holds a large number of recording mediums on which music signals are recorded,

a recording medium playback means that plays the recording medium and outputs music signals,

an exchange means that takes the desired recording medium from the recording medium holding means and places it in the recording medium playback means, and that returns a recording medium placed in the recording medium playback means to the recording medium holding means,

a recording medium guide information memory means that can store the recording medium title, genre, and a part of the music signals recorded on the recording medium correlated to the recording mediums, separately from the recording mediums held in the recording medium holding means,

an input means to input the title and genre of a certain desired recording medium,

a recording medium guide text information registration means that stores, correlated to said certain desired recording medium in the recording medium guide information memory

means, when the title and genre of a certain desired recording medium are input by the input means,

a music signal registration designation means that designates registration of the music signal recorded on a certain desired recording medium,

a recording medium guide music signal registration means that, when registration of the music signal recorded on a certain desired recording medium is designated by the music signal registration designation means, and after the exchange means is controlled to remove said certain desired recording medium from the recording medium holding means and place it in the recording medium playback means, controls the recording medium playback means and stores the music signal played back from a specific portion of the recording medium, or from a certain portion designated by a user, correlated to said certain desired recording medium in the recording medium guide information memory means,

a display means that displays titles,

a searched genre input means for inputting a searched genre,

and a playback control means that, during searching of the recording mediums, displays as a list, or switches the display of, on the display means, titles corresponding to the desired recording medium, from the titles registered correlated to each of the recording mediums in the recording medium guide information memory means, according to the desired genre input by the searched genre input mean; that reads and outputs the music signal correlated to the same recording medium as the desired title from the recording medium guide information memory means, when said desired title is selected by a user from said display; and that controls the exchange means to take the recording medium correlated to said desired title from the recording medium holding means and place it in the recording medium playback means, and then controls the recording medium playback means to provide playback, when the user designates playback.

8. A changer-type recording medium playback means, characterized in being provided with:

a recording medium holding means that holds a large number of recording mediums on which music signals are recorded,

a recording medium playback means that plays the recording mediums and outputs music signals,

an exchange means that takes the desired recording medium from the recording medium holding means and places it in the recording medium playback means, and that returns a recording medium placed in the recording medium playback means to the recording medium holding means,

a recording medium guide information memory means that can store the recording medium title, artist name, and a part of the music signals recorded on the recording mediums,

correlated to the recording mediums, separately from the recording mediums held in the recording medium holding means,

an input means to input the title and artist name of a certain desired recording medium,

a recording medium guide text information registration means that stores, correlated to said certain desired recording medium in the recording medium guide information memory means, when the title and artist name of a certain desired recording medium is input by the input means,

a music signal registration designation means that designates registration of the music signal recorded on a certain desired recording medium,

a recording medium guide music signal registration means that, when registration of the music signal recorded on a certain desired recording medium is designated by the music signal registration designation means, and after the exchange means is controlled to take said certain desired recording medium from the recording medium holding means and place it in the recording medium playback means, controls the recording medium playback means and stores the music signal played from a specific portion of the recording medium, or from a certain portion designated by the user, correlated to said certain desired recording medium in the recording medium guide information memory means,

a searched artist name input means to input a searched artist name,

and a playback control means that, during searching of the recording mediums, displays as a list, or switches the display of, on the display means, the titles corresponding to the desired artist name, from the titles registered correlated to the individual recording mediums in the recording medium guide information memory means, according to the desired artist name input by the searched artist name input means; that reads and outputs the music signals correlated to the same recording medium as the desired title from the recording medium guide information memory means, when a user selects said desired title from said display; and that controls the exchange means to take the recording medium correlated to said desired title from the recording medium holding means and place it in the recording medium playback means, and then controls the recording medium playback means to provide playback, when the user designates playback.

9. A changer-type recording medium playback means, characterized in being provided with:

a recording medium holding means that holds a large number of recording mediums on which music signals are recorded,

a recording medium playback means that plays the recording mediums and outputs music signals,

an exchange means that takes the desired recording medium from the recording medium holding means and places it in the recording medium playback means, and that returns a



recording medium placed in the recording medium playback means to the recording medium holding means,

a recording medium guide information memory means that can store text information associated with the recorded content on the recording mediums and a part of the music signals recorded on the recording mediums correlated to the recording mediums, separately from the recording mediums held in the recording medium holding means,

an input means to input text information associated with the recorded content on a certain desired recording medium,

a recording medium guide text information registration means that stores, correlated to said certain desired recording medium in the recording medium guide information memory means, when text information associated with the recorded content on a certain desired memory medium is input by the input means,

a recording medium guide music signal registration means that controls the exchange means to place each recording medium held in the recording medium holding means in the recording medium playback means while exchanging them, controls the recording medium playback means and stores the music signal played from a specific portion of the recording medium, or from a certain portion designated by the user, in the recording medium guide information memory means correlated to the recording medium that was played back,

a display means that displays text information,

and a playback control means that, during searching of the recording mediums, displays as a list, or switches the display of, on the display means, text information registered correlated to each recording medium on the recording medium guide information memory means; that reads and outputs the music signal correlated to the same recording medium as the desired text information from the recording medium guide information memory means, when said desired text information is selected by the user from said display; and that controls the exchange means to take the recording medium correlated to said desired title name from the recording medium holding means and place it in the recording medium playback means, and then controls the recording medium playback means to provide playback, when the user designates playback.

10. The changer-type recording medium playback means described in Claim 9, characterized in that

the text information associated with the recorded content on the recording medium is the title.

11. A changer-type recording medium playback means, characterized in being provided with:

a recording medium holding means that holds a large number of recording mediums on which music signals are recorded,

a recording medium playback means that plays the recording mediums and outputs music signals,

an exchange means that takes the desired recording medium from the recording medium holding means and places it in the recording medium playback means, and that returns a recording medium placed in the recording medium playback means to the recording medium holding means,

a recording medium guide information memory means that can store the recording medium title, genre and a part of the music signals recorded on the recording mediums correlated to the recording mediums, separately from the recording mediums held in the recording medium holding means,

an input means to input the title and genre of a certain desired recording medium,

a recording medium guide text information registration means that stores, correlated to said certain desired recording medium in the recording medium guide information memory means, when the title and genre of a certain desired recording medium are input by the input means,

a recording medium guide music signal registration means that controls the exchange means to place each recording medium held in the recording medium holding means in the recording medium playback means while exchanging them, controls the recording medium playback means and stores the music signal played from a specific portion of the recording medium, or from a certain portion designated by the user, in the recording medium guide information memory means correlated to the recording medium that was played back,

a display means to display titles,

a searched genre input means to input a searched genre,

and a recording medium playback control means that, during searching of the recording mediums, displays as a list, or switches the display of, on the display means, the titles corresponding to the desired genre, from the titles registered correlated to the individual recording mediums in the recording medium guide information memory means, according to the desired genre input by the genre input means; that reads and outputs the music signals correlated to the same recording medium as the desired title from the recording medium guide information memory means, when a user selects said title from said display; and that controls the exchange means to take the recording medium correlated to said desired title from the recording medium holding means and place it in the recording medium playback means, and then controls the recording medium playback means to provide playback, when the user designates playback.

12. A changer-type recording medium playback device, characterized in being provided with:

a recording medium holding means that holds a large number of recording mediums on which music signals are recorded,

a recording medium playback means that plays the recording mediums and outputs music signals,

an exchange means that takes the desired recording medium from the recording medium holding means and places it in the recording medium playback means, and that returns a recording medium placed in the recording medium playback means to the recording medium holding means,

a recording medium guide information memory means that can store the recording medium title, artist name and a part of the music signals recorded on the recording mediums correlated to the recording mediums, separately from the recording mediums held in the recording medium holding means,

an input means to input the title and artist name of a certain desired recording medium,

a recording medium guide information registration means that stores, correlated to said certain desired recording medium in the recording medium guide information memory means, when the title and artist name of a certain desired recording medium are input by the input means,

a recording medium guide music signal registration means that controls the exchange means to place each recording medium held in the recording medium holding means in the recording medium playback means while exchanging them, controls the recording medium playback means and stores the music signal played from a specific portion of the recording medium, or from a certain portion designated by the user, in the recording medium guide information memory means correlated to the recording medium that was played back,

a display means to display titles,

a searched artist name input means to input a searched artist name,

and a playback control means that, during searching of the recording mediums, displays as a list, or switches the display of, on the display means, the titles corresponding to the desired artist name, from the titles registered correlated to the individual recording mediums in the recording medium guide information memory means, according to the desired artist name input by the artist name input means; that reads and outputs the music signals correlated to the same recording medium as the desired title from the recording medium guide information memory means, when a user selects said desired title from said display; and that controls the exchange means to take the recording medium correlated to said desired title from the recording medium holding means and place it in the recording medium playback means, and then controls the recording medium playback means to provide playback, when the user designates playback.

13. A changer-type recording medium playback device, characterized in being provided with:

a recording medium holding means that holds a large number of recording mediums on which music signals are recorded,

a recording medium playback means that plays the recording mediums and outputs music signals,

an exchange means that takes the desired recording medium from the recording medium holding means and places it in the recording medium playback means, and that returns a recording medium placed in the recording medium playback means to the recording medium holding means,

a recording medium guide information memory means that can store text information associated with the recorded content on the recording mediums and a part of the music signals recorded on the recording mediums correlated to the recording mediums, separately from the recording mediums held in the recording medium holding means,

an input means to input text information associated with the recorded content on a certain desired recording medium,

a recording medium guide information registration means that stores, correlated to said certain desired recording medium in the recording medium guide information memory means, when text information associated with the recorded content on a certain desired recording medium is input by the input means, and that also controls the exchange means to take said certain desired recording medium held in the recording medium holding means and place it in the recording medium playback means, controls the recording medium playback means, and stores the music signal played back from a specific portion of the recording medium, or from a portion designated by a user, correlated to said certain desired recording medium in the recording medium guide information memory means,

a display means to display text information,

and a playback control means that, during searching of the recording mediums, displays as a list, or changes the display of, on the display means, the text information registered correlated to each recording medium in the recording medium guide information memory means; that reads and outputs the music signal corresponding to the same recording medium as the desired text information from the recording medium guide information memory means, when said desired text information is selected by the user from said display; and that controls the exchange means to take the recording medium correlated to said desired title from the recording medium holding means and place it in the recording medium playback means, and then controls the recording medium playback means to provide playback, when the user designates playback.

14. The changer-type recording medium playback device described in Claim 13, characterized in that

the text information associated with the recorded content on the recording mediums is the title.

15. A changer-type recording medium playback device, characterized in being provided with:

a recording medium holding means that holds a large number of recording mediums on which music signals are recorded,

a recording medium playback means that plays the recording mediums and outputs music signals,

an exchange means that takes the desired recording medium from the recording medium holding means and places it in the recording medium playback means, and that returns a recording medium placed in the recording medium playback means to the recording medium holding means,

a recording medium guide information memory means that can store the recording medium title and genre and a part of the music signals recorded on the recording mediums correlated to the recording mediums, separately from the recording mediums held in the recording medium holding means,

an input means to input the title and genre of a certain desired recording medium,

a recording medium guide information registration means that stores, correlated to a said certain desired recording medium in the recording medium guide information memory means, when the title and genre of a certain desired recording medium are input by the input means, and that also controls the exchange means to take said certain desired recording medium held in the recording medium holding means and place it in the recording medium playback means, controls the recording medium playback means, and stores the music signal played back from a specific portion of the recording medium, or from a portion designated by a user, correlated to said certain desired recording medium in the recording medium guide information memory means,

a display means to input titles,

a searched genre input means to input a searched genre,

and a playback control means that, during searching of the recording mediums, displays as a list, or switches the display of, on the display means, the titles registered correlated to the individual recording mediums in the recording medium guide information memory means, according to the desired genre input by the searched genre input means; that reads and outputs the music signals correlated to the same recording medium as the desired title from the recording medium guide information memory means, when a user selects said desired title from said display; and that controls the exchange means to take the recording medium correlated to said desired title from the recording medium holding means and place it in the recording medium

playback means, and then controls the recording medium playback means to provide playback, when the user designates playback.

16. A changer-type recording medium playback device, characterized in being provided with:

a recording medium holding means that holds a large number of recording mediums on which music signals are recorded,

a recording medium playback means that plays the recording mediums and outputs music signals,

an exchange means that takes the desired recording medium from the recording medium holding means and places it in the recording medium playback means, and that returns a recording medium placed in the recording medium playback means to the recording medium holding means,

a recording medium guide information memory means that can store the recording medium title and artist name and a part of the music signals recorded on the recording mediums correlated to the recording mediums, separately from the recording mediums held in the recording medium holding means,

an input means to input the title and artist name of a certain desired recording medium,

a recording medium guide information registration means that stores, correlated to said certain desired recording medium in the recording medium guide information memory means when the title and artist name of a certain desired recording medium are input by the input means, and also controls the exchange means to take said certain desired recording medium held in the recording medium holding means and place it in the recording medium playback means, controls the recording medium playback means, and stores the music signal reproduced from a specific portion of the recording medium, or a certain portion designated by a user, correlated to said certain desired recording medium in the recording medium guide information memory means.

a display means to display titles,

a searched artist name input means to input a searched artist name,

and a playback control means that, during searching of the recording mediums, displays as a list, or changes the display of, on the display means, the titles registered correlated to the individual recording mediums in the recording medium guide information memory means, according to the desired artist name input by the searched artist name input means; that reads and outputs the music signal correlated to the same recording medium as the desired title from the recording medium guide information memory means, when said desired title is selected by the user from said display; and that controls the exchange means to take the recording medium correlated to said desired title from the recording medium holding means and place it in the

recording medium playback device, and then controls the recording medium playback device to provide playback, when the user designates playback.

17. A changer-type recording medium playback device, characterized in being provided with:

a recording medium holding means that holds a large number of recording mediums on which music signals are recorded,

a recording medium playback means that plays the recording mediums and outputs music signals,

an exchange means that takes the desired recording medium from the recording medium holding means and places it in the recording medium playback means, and that returns a recording medium placed in the recording medium playback means to the recording medium holding means,

a recording medium guide information memory means that stores text information associated with the recorded content on the recording mediums and a part of the music signals recorded on the recording mediums correlated to the recording mediums, separately from the recording mediums held in the recording medium holding means,

a selecting means to select a recording medium for which playback is desired,

a first playback control means that controls the exchange means to take said certain desired recording medium held in the recording medium holding means and place it in the recording medium playback means, that controls the recording medium playback means to play back said certain desired recording medium, and that stores the music signal from a specific portion in the middle, or from a certain portion designated by the user, correlated to said certain desired recording medium in the recording medium guide information memory means, when a recording medium for which playback is desired is selected by the selecting means,

an input means to input text information associated with the recorded content on a certain desired recording medium,

a recording medium guide information registration means that stores, correlated to said certain desired recording medium in the recording medium guide information memory means, when there is input of text information associated with the recorded content on the certain desired recording medium by the input means,

a display means to display text information,

and a second playback control means that, during searching of the recording mediums, displays as a list, or changes the display of, on the display means, the text information registered correlated to the individual recording mediums in the recording medium guide information memory means; that reads and outputs the music signal correlated to the same recording medium as the desired text information from the recording medium guide information memory means,

when said desired text information is selected by the user from said display; and that controls the exchange means to take the recording medium correlated to said desired title from the recording medium holding means and place it in the recording medium playback means, and then controls the recording medium playback means to provide playback, when the user designates playback.

18. The changer-type recording medium playback device described in Claim 17, characterized in that

the text information associated with the recorded content on the recording mediums is the title.

19. A changer-type recording medium playback device, characterized in being provided with:

a recording medium holding means that holds a large number of recording mediums on which music signals are recorded,

a recording medium playback means that plays the recording mediums and outputs music signals,

an exchange means that takes the desired recording medium from the recording medium holding means and places it in the recording medium playback means, and that returns a recording medium placed in the recording medium playback means to the recording medium holding means,

a recording medium guide information memory means that can store the recording medium title and genre and a part of the music signals recorded on the recording mediums correlated to the recording mediums, separately from the recording mediums held in the recording medium holding means,

a selecting means to select a recording medium for which playback is desired,

a first playback control means that controls the exchange means to take said certain desired recording medium held in the recording medium holding means and place it in the recording medium playback means, that controls the recording medium playback means to play back said certain desired recording medium, and that stores the music signal from a specific portion in the middle, or from a certain portion designated by the user, correlated to said certain desired recording medium in the recording medium guide information memory means, when a recording medium for which playback is desired is selected by the selecting means,

an input means to input the title and genre of a certain desired recording medium,

a recording medium guide information registration means that stores, correlated to said certain desired recording medium in the recording medium guide information memory means, when the title and genre of a certain desired recording medium are input by the input means,

a display means to display titles,

a searched genre input means to input a searched genre,



and a second playback control means that, during searching of the recording mediums, displays as a list, or switches the display of, on the display means, the titles registered correlated to the individual recording mediums in the recording medium guide information memory means, according to the desired genre input by the searched genre input means; that reads and outputs the music signal correlated to the same recording medium as the desired title from the recording medium guide information memory means, when said desired title is selected by the user from said display; and that controls the exchange means to take the recording medium correlated to said desired title from the recording medium holding means and place it in the recording medium playback means, and then controls the recording medium playback means to provide playback, when the user designates playback.

20. A changer-type recording medium playback device, characterized in being provided with:

a recording medium holding means that holds a large number of recording mediums on which music signals are recorded,

a recording medium playback means that plays the recording mediums and outputs music signals,

an exchange means that takes the desired recording medium from the recording medium holding means and places it in the recording medium playback means, and that returns a recording medium placed in the recording medium playback means to the recording medium holding means,

a recording medium guide information memory means that can store the recording medium title and artist name and a part of the music signals recorded on the recording mediums correlated to the recording mediums, separately from the recording mediums held in the recording medium holding means,

a selecting means to select a recording medium for which playback is desired,

a first playback control means that controls the exchange means to take said certain desired recording medium held in the recording medium holding means and place it in the recording medium playback means, that controls the recording medium playback means to play back said certain desired recording medium, and that stores the music signal from a specific portion in the middle, or from a certain portion designated by the user, correlated to said certain desired recording medium in the recording medium guide information memory means, when a recording medium for which playback is desired is selected by the selecting means,

an input means to input the title and artist name of a certain desired recording medium,

a recording medium guide information registration means that stores, correlated to said certain desired recording medium in the recording medium guide information memory means, when the title and artist name of a certain desired recording medium are input by the input means,

a display means to display titles,  
 a searched artist input means to input a searched artist name,  
 and a second playback control means that, during searching of the recording mediums, displays as a list, or switches the display of, on the display means, the titles registered correlated to the individual recording mediums in the recording medium guide information memory means, according to the desired artist name input by the searched artist name input means; that reads and outputs the music signals correlated to the same recording medium as the desired title from the recording medium guide information memory means, when a user selects said desired title from said display; and that controls the exchange means to take the recording medium correlated to said desired title from the recording medium holding means and place it in the recording medium playback means, and then controls the recording medium playback means to provide playback, when the user designates playback.

#### Detailed explanation of the invention

[0001]

##### Technical field of the invention

The present invention pertains to a changer-type recording medium playback device, and relates in particular to a changer-type recording medium playback device that can find and play a desired recording medium without mistakes, from among a large number of recording mediums.

[0002]

##### Prior art

There are changer-type CD players that can store a large number of CDs (compact discs) on which music signals are recorded, and switch to and play the desired CD. Figure 24 is a block diagram showing one example of a conventional changer-type CD player. 1 is a holding unit that has N holding locations, from pallet number 1 to N, and that can hold N CDs  $2_1$ - $2_N$  (the subscript indicates the disc number). 3 is a CD playback unit, which reads and outputs TOC (Table of Contents) information recorded in the lead-in area from CD  $2_i$  (1 [sic; i] is any one integer, from 1 to N), reproduces and outputs the digital music signal recorded in the program area, and modulates and outputs subcodes. 4 is an exchange unit that takes the desired CD  $2_i$  from the desired holding location in holding unit 1, loads it by placing it in CD playback unit 3, and in the opposite way, unloads by returning CD  $2_i$  placed in CD playback unit 3 to the original holding location in holding unit 1. 5 is a D/A converting unit that D/A converts the digital music signal output from CD playback unit 3 to an analog music signal and outputs it. 6 is an operating unit, and 7 is a control unit constructed with a microcomputer that manages overall control of the set. For example, when a user designates playback of CD with disc number i with operating unit 6,

exchange unit 4 is controlled, and desired CD 2<sub>i</sub> held at desired pallet number i in holding unit 1 is taken out and placed in CD playback unit 3. Then CD playback unit 3 is controlled, the TOC information in the lead-in area is read and input, and is stored in a built-in memory 8 in control unit 7. Then, the beginning of the first song is searched for by referencing said TOC information, and playback is started after the search. The digital music signal output from CD playback unit 3 is D/A converted with D/A converting unit 5 and is output externally. During playback, control unit 7 accepts input of subcodes from CD playback unit 3, compares with the TOC information, and identifies whether playback reaches the end of the last song. If playback reaches the end of the last song, CD playback unit 3 is controlled to stop playback, and exchange unit 4 is controlled to return CD 2<sub>i</sub> placed in CD playback unit 3 to the original position in holding unit 1.

[0003]

In this connection, when a large number of CDs, several hundred, for example, can be held, the user must remember which CDs are held at which location in holding unit 1. For this reason, large capacity changer-type CD players are provided with a CD search function so that the desired CD can be searched for easily. Conventional CD search functions include sequential playback types and title display types, by broad classification. With the former sequential playback types, for example, when a disc search operation is designated with operating unit 6, control unit 7 follows the disc search processing in Figure 25 and controls exchange unit 4, CD 2<sub>1</sub>, which is disc number 1, is taken from the holding location at pallet number 1 in holding unit 1, and it is placed in CD playback unit 3. CD playback unit 3 is controlled, and the TOC information in the lead-in area is read and input and is stored in built-in memory 8 in control unit 7. Then the beginning of the first song is searched for by referring to said TOC information, and playback is started after the search (steps S10-S13 in Figure 25). Then, if not designated by the pressing of the OK key on operating unit 6 within 10 sec (NO at step S14, YES at S15), CD playback unit 3 is controlled to stop playback, and exchange unit 4 is controlled to return CD 2<sub>1</sub> placed in CD playback unit 3 to the original location in holding unit 1 (steps S16 and S17).

[0004]

Next, exchange unit 4 is controlled to take CD 2<sub>2</sub>, which is disc number 2, from the holding location at pallet 2 in holding unit 1 and place it in CD playback unit 3. CD playback unit 3 is controlled, and the TOC information in the lead-in area is read and input and is stored in built-in memory 8 in control unit 7. Then the beginning of the first song is searched for by referring to said TOC information, and playback is started after the search (steps S18, S19, S11-S13). Then, if playback is not designated by the pressing of the OK key on operating unit 6 within 10 sec (NO at step S14, YES at S15), CD playback unit 3 is controlled to stop playback,

and exchange unit 4 is controlled to return CD 2<sub>2</sub> placed in CD playback unit 3 to the original location in holding unit 1 (steps S16 and S17). The same processing is repeated to number N thereafter. During this, if the user listening to the music at the beginning of the first song on CD 2<sub>n</sub>, which is disc number n, decides it is the desired CD, he presses the OK key with operating unit 6 and designates playback. Then, control unit 7 controls CD playback unit 3, the beginning of the first song on CD 2<sub>n</sub> is searched for, and playback is started after the search (step S20). If playback in CD playback unit 3 reaches the end of the last song, exchange unit 4 is controlled to return CD 2<sub>n</sub> that is placed in CD playback unit 3 in the original location in holding unit 1 (steps S21-S23).

[0005]

On the other hand, with the latter title display types, control unit 7 has the titles that have been input with text according to disc number by the user with operating unit 6 stored according to disc number as in Figure 26 in a memory unit 9 (Note that TD<sub>1</sub>-TD<sub>N</sub> in Figure 26 are text data representing titles). Then, when a disc search is designated with operating unit 6, the titles for disc numbers 1 to 10 are displayed together in a list as titles numbers 01-10 on a display unit 10 (refer to Figure 27). When the user's desired title is not present, when the next page key on operating unit 6 is pressed, control unit 7 displays the titles for disc numbers 11 to 20 together in a list as titles numbers 01-10. Thereafter, in the same way, each time the next page key is pressed, 10 new titles are displayed as a list. If the user finds the desired title during this, he inputs the corresponding title number to designate playback. Then, control unit 7 controls exchange unit 4, using the disc number corresponding to the desired title designated by the user as n, and CD 2<sub>n</sub>, which is disc number n, is taken out and placed in CD playback unit 3. CD playback unit 3 is controlled, the TOC information in the lead-in area is read and input, and it is stored in built-in memory 8 in control unit 7. Then, the beginning of the first song is searched for by referring to said TOC information, and playback is started after the search. If playback reaches the end of the last song, CD playback unit 3 is controlled to stop playback, and exchange unit 4 is controlled to return CD 2<sub>n</sub> that is placed in CD playback unit 3 to the original location in holding unit 1.

[0006]

Problems to be solved by the invention

With the former sequential playback type CD search function, however, there is the advantage that the user can accurately recognize what the content of the CD is by actually listening to the music recorded on the CD and can select the desired CD without mistakes, but the disadvantage is that the CDs must be exchanged one by one between holding unit 1 and playback unit 3, which takes too much time until the desired CD is found. With the latter title

display type, it is difficult to correctly remember the musical content from the individual titles when a large number of CDs are held, so the desired CD will be searched for using trial and error over and over, with the disadvantage that it will take some time to find the desired CD. The objective of the present invention is to solve the aforementioned problems with the prior art and provide a changer-type recording medium playback device that can quickly and accurately find and play the desired recording medium.

[0007]

Means to solve the problems

The changer-type recording medium playback device described in Claim 1 of the present invention is characterized in being provided with: a recording medium holding means that holds a large number of recording mediums on which music signals are recorded, a recording medium playback means that plays the recording mediums and outputs music signals, an exchange means that takes the desired recording medium from the recording medium holding means and places it in the recording medium playback means, and that returns a recording medium placed in the recording medium playback means to the recording medium holding means, a recording medium guide information memory means that stores text information associated with the recorded content on the recording mediums and a part of the music signals recorded on the recording mediums correlated to the recording mediums, separately from the recording mediums held in the recording medium holding means, a display means that displays text information, and a playback control means that, during searching of the recording mediums, displays as a list, or switches the display of, on the display means, the text information registered correlated to each recording medium in the recording medium guide information memory means; that reads and outputs the desired text information and the music signals correlated to the same recording medium from the recording medium guide information memory means, when a user selects said text information corresponding to a desired recording medium from said display; and that controls the exchange means to take the recording medium correlated to said desired text information from the recording medium holding means and to place it in the recording medium playback means, and then controls the recording medium playback means to provide playback, when the user designates playback. With Claim 1, during searching of the recording mediums, when the desired text information is selected from that displayed as a list or displayed by switching on the display means, the music signal correlated to the same recording medium as said desired text information is read and output immediately from the recording medium guide information memory means. So the user can immediately confirm whether the recording medium selected as a rough guess from the text information is the one with the desired recorded content. If it is the desired recording medium, playback of the recording medium correlated to said

desired text information can be quickly executed by playback being designated. Claim 3 of the present invention is characterized in that the recording medium title and genre and a part of the music signals recorded on the recording mediums are stored separately from the recording medium in a medium guide information memory means. A display means to display titles and a searched genre input means to input a searched genre are also provided. The playback control means, during searching of the recording mediums, displays as a list, or switches the display of, on the display means, the titles corresponding to the desired genre, from the titles registered correlated to the individual recording mediums in the recording medium guide information memory means, according to the desired genre input by the searched genre input means; it reads and outputs the music signals correlated to the same recording medium as the desired title from the recording medium guide information memory means, when a user selects said desired title from said display; and it controls the exchange means to take the recording medium correlated to said desired title from the recording medium holding means and place it in the recording medium playback means, and then controls the recording medium playback means to provide playback, when the user designates playback. With Claim 3, during searching of the recording mediums, when the desired title is selected from those displayed as a list or displayed by switching on the display means, the music signal correlated to the same recording medium as said desired title is read and output immediately from the recording medium guide information memory means. So the user can immediately confirm whether the recording medium selected as a rough guess from the title is the one with the desired recorded content. If it is the desired recording medium, playback of the recording medium correlated to said desired title can be quickly executed by playback being designated. Furthermore, when searching for the desired recording medium, the desired title can be found from the group of titles narrowed to the desired genre, so the desired recording medium can be found easily. Claim 4 is characterized in that the recording medium title and artist name, and a part of the music signals recorded on the recording mediums, are stored correlated to the recording mediums separately from the recording mediums in a recording medium guide information memory means. A display means to display titles and a searched artist name input means to input a search artist name are also provided. The playback control means, during searching of the recording mediums, displays as a list, or switches the display of, on the display means, the titles corresponding to the desired artist name, from the titles registered correlated to the individual recording mediums in the recording medium guide information memory means, according to the desired artist name input by the searched artist name input means; it reads and outputs the music signals correlated to the same recording medium as the desired title from the recording medium guide information memory means, when a user selects said desired title from said display; and it controls the exchange means to take the recording medium correlated to said desired title from the recording medium holding means and place it in

the recording medium playback means, and then controls the recording medium playback means to provide playback, when the user designates playback. With Claim 4, during searching of the recording mediums, when the desired title is selected from those displayed as a list or displayed by switching on the display means, the music signal correlated to the same recording medium as said desired title is read and output immediately from the recording medium guide information memory means. So the user can immediately confirm whether the recording medium selected as a rough guess from the title is the one with the desired recorded content. If it is the desired recording medium, playback of the recording medium correlated to said desired title can be quickly executed by playback being designated. Furthermore, when searching for the desired recording medium, the desired title can be found from the group of titles narrowed to the desired artist, so the desired recording medium can be found easily. Claim 5 of the present invention is characterized in being provided with: a recording medium guide information memory means that can store text information associated with the recorded content of the recording mediums and a part of the music signals recorded on the recording medium correlated to the recording mediums, separately from the recording mediums held in the recording medium holding means, an input means to input text information associated with the recorded content on a certain desired recording medium, a recording medium guide text information registration means that stores in the recording medium guide information memory means correlated to said certain desired recording medium, when text information associated with the recorded content on a certain desired recording medium is input by the input means, a music signal registration designation means that designates registration of the music signal recorded on a certain desired recording medium, a recording medium guide music signal registration means that, when registration of the music signal recorded on a certain desired recording medium is designated by the music signal registration designation means, and after the exchange means is controlled to remove said certain desired recording medium from the recording medium holding means and place it in the recording medium playback means, controls the recording medium playback means and stores the music signal played back from a specific portion of the recording medium, or from a certain portion designated by a user, correlated to said certain desired recording medium in the recording medium guide information memory means, a display means that displays text information, and a playback control means that, during searching of the recording mediums, displays as a list, or switches the display of, on the display means, text information registered correlated to each recording medium in the recording medium guide information memory means; that reads and outputs the music signal correlated to the same recording medium as the desired text information from the recording medium guide information memory means, when said text information corresponding to the desired recording medium is selected by a user from said display; and that controls the exchange means to take the recording medium correlated to said desired text

information from the recording medium holding means and place it in the recording medium playback means, and then controls the recording medium playback means to provide playback, when the user designates playback. With Claim 5, if text information and the music signal for the individual recording mediums held in the recording medium holding means are registered, during searching of the recording mediums, when the desired text information is selected from those displayed as a list, or displayed by switching, on the display means, the music signal correlated to the same recording medium as said desired text information is read and output immediately from the recording medium guide information memory means. So the user can immediately confirm whether the recording medium selected as a rough guess from the text information is the one with the desired recorded content. If it is the desired recording medium, playback of the recording medium correlated to said desired text information can be quickly executed by playback being designated. In addition, the preferred text information can be registered for individual recording mediums, so text information appropriate to a new recording medium can be registered all over when a recording medium is replaced. Text information registration and music signal registration are also performed independently, so when a recording medium is replaced and it is all right to leave the text information registered for the previous recording medium, the text information input operation can be skipped. Claim 7 of the present invention is characterized in that the recording medium title and genre, and a part of the music signals recorded on the recording mediums, are stored correlated to the recording mediums separately from the recording mediums, in a recording medium guide information memory means. A display means to display titles and a searched genre input means to input a searched genre are also provided. The playback control means, during searching of the recording mediums, displays as a list, or switches the display of, on the display means, titles corresponding to the desired recording medium, from the titles registered correlated to each of the recording mediums in the recording medium guide information memory means, according to the desired genre input by the searched genre input mean; it reads and outputs the music signal correlated to the same recording medium as the desired title from the recording medium guide information memory means, when said desired title is selected by a user from said display; and it controls the exchange means to take the recording medium correlated to said desired title from the recording medium holding means and place it in the recording medium playback means, and then controls the recording medium playback means to provide playback, when the user designates playback. With Claim 7, if the title, genre and music signal are registered for each recording medium held in the recording medium holding means, during searching of the recording mediums, when the desired title is selected from those that are displayed as a list, or displayed by switching, on the display means, the music signal correlated to the same recording medium as said desired text information is read and output immediately from the recording medium guide information



memory means. So the user can immediately confirm whether the recording medium selected as a rough guess from the title is the one with the desired recorded content. If it is the desired recording medium, playback of the recording medium correlated to said desired title can be quickly executed by playback being designated. In addition, the preferred title can be registered for individual recording mediums, so a title appropriate to a new recording medium can be registered all over when a recording medium is replaced. Title and genre registration and music signal registration are also performed independently, so when a recording medium is replaced and it is all right to leave the title and genre registered for the previous recording medium, the title and genre input operations can be skipped. In addition, when searching for the desired recording medium, the desired title can be found from the group of titles narrowed to the desired genre, so the desired recording medium can be found easily. Claim 8 is characterized in that the recording medium title and artist name, and a part of the music signals recorded on the recording mediums, can be stored correlated to the recording mediums separately from the recording mediums in a recording medium guide information memory means. A display means to display titles and a searched artist name input means to input a searched artist name are also provided. The playback control means, during searching of the recording mediums, displays as a list, or switches the display of, on the display means, the titles corresponding to the desired artist name, from the titles registered correlated to the individual recording mediums in the recording medium guide information memory means, according to the desired artist name input by the searched artist name input means; it reads and outputs the music signals correlated to the same recording medium as the desired title from the recording medium guide information memory means, when a user selects said desired title from said display; and it controls the exchange means to take the recording medium correlated to said desired title from the recording medium holding means and place it in the recording medium playback means, and then controls the recording medium playback means to provide playback, when the user designates playback. With Claim 8, if the title, artist and music signal are registered for each recording medium held in the recording medium holding means, during searching of the recording mediums, when the desired title is selected from those that are displayed as a list, or displayed by switching, on the display means, the music signal correlated to the same recording medium as said desired title is read and output immediately from the recording medium guide information memory means. So the user can immediately confirm whether the recording medium selected as a rough guess from the title is the one with the desired recorded content. If it is the desired recording medium, playback of the recording medium correlated to said desired title can be quickly executed by playback being designated. In addition, the preferred title can be registered for individual recording mediums, so a title appropriate to a new recording medium can be registered all over when a recording medium is replaced. Title and artist name registration and music signal registration are also

performed independently, so when a recording medium is replaced and it is all right to leave the title and artist name registered for the previous recording medium, the title and artist name input operations can be skipped. In addition, when searching for the desired recording medium, the desired title can be found from the group of titles narrowed to CDs with the desired artist, so the desired recording medium can be found easily. Claims 9-12 of the present invention are characterized in that a recording medium guide music signal registration means controls the exchange means to place each recording medium held in the recording medium holding means in the recording medium playback means while exchanging them, controls the recording medium playback means and stores the music signal played from a specific portion of the recording medium, or from a certain portion designated by the user, in the recording medium guide information memory means correlated to the recording medium that was played back. With Claims 9-12, rather than the user designating recording mediums for which the music signal is to be registered one by one, the music signals are registered while each recording medium held in the recording medium holding means is exchanged automatically, so user effort is reduced. Then, with Claims 9, 11 and 12, the same effects as with Claims 5, 7 and 8 described above are obtained. With Claims 13, 15 and 16 of the present invention, a recording medium guide information registration means stores, correlated to a certain desired recording medium in the recording medium guide information memory means, when text information associated with the recorded content on said certain desired recording medium, or the title and genre, or the title and artist name, are input by the input means. It also controls the exchange means to take said certain desired recording medium held in the recording medium holding means and place it in the recording medium playback means, controls the recording medium playback means, and stores the music signal played back from a specific portion of the recording medium, or from a portion designated by a user, correlated to said certain desired recording medium in the recording medium guide information memory means. With Claims 13, 15 and 16, when the user inputs text information associated with a certain desired recording medium, or the title and genre, or the title and artist name, reading and registration of the music signal on said certain desired recording medium is automatically executed, so it is not necessary for the user to designate recording mediums for which the music signal is to be registered one by one. Claims 17-20 are characterized in being provided with a selecting means to select a recording medium for which playback is desired, and a first playback control means that controls the exchange means to take a certain desired recording medium held in the recording medium holding means and place it in the recording medium playback means, that controls the recording medium playback means to play back said certain desired recording medium, and that stores the music signal from a specific portion in the middle, or from a certain portion designated by the user, correlated to said certain desired recording medium in the recording medium guide information memory means, when a

recording medium for which playback is desired is selected by the selecting means. With Claims 17-20, the music signals are registered during normal playback of the desired recording medium, so no extra time to register music signals is needed. Claims 2, 6, 10, 14 and 18 are characterized in that the text information in individual Claims 1, 5, 9, 13 and 17 includes the title.

[0008]

#### Embodiment of the invention

Next, one embodiment of the present invention will be explained by referring to Figure 1. Figure 1 is a block diagram showing the configuration of a changer-type CD player pertaining to the present invention, and the same symbols are used for the same component elements as in Figure 24. 1 is a holding unit that has N holding locations, from pallet number 1 to N, and that can hold N CDs  $2_1-2_N$  (the subscript indicates the disc number). 3 is a CD playback unit, which reads and outputs TOC (Table of Contents) information recorded in the lead-in area from CD  $2_i$  (1 [sic; i] is any one integer, from 1-N), reproduces and outputs the digital music signal recorded in the program area, and modulates and outputs subcodes. 4 is an exchange unit that takes the desired CD  $2_i$  from the desired holding location in holding unit 1, loads it by placing in CD playback unit 3, and in the opposite way, unloads by returning CD  $2_i$  placed in CD playback unit 3 to the original holding location in holding unit 1. 5 is a D/A converting unit that D/A converts the digital music signal output from CD playback unit 3 or the digital music signal read from memory unit 9A, described below, to an analog music signal and outputs it. 6A is an operating unit for searching for the desired CD, registering text information (title, genre, artist name. same hereafter) associated with the recorded content on the desired CD, and registering the music signal recorded at the beginning spot for the first song on the desired CD. 9A is a memory unit that stores text information and music signals correlated to the CDs, separately from the individual CDs held in storage unit 1 (refer to Figure 2). 10 is a display unit that can display titles as a list. 11 is a switch that selectively switches the D/A converter unit input to the digital music signal output from CD playback unit 3 and to the digital music signal read from memory unit 9A. 7A is a control unit constructed with a microcomputer that manages overall control of the set, and executes registration processing for text information associated with the recorded content on the desired CD, registration processing of the music signal at a specific portion recorded on the desired CD, and search processing for the desired CD.

[0009]

Figures 4-12 are a flowchart showing the main processing by control unit 7A, Figure 13 is a flowchart showing music signal registration processing done in parallel with the main processing, and Figure 3 is a diagram explaining the stored content in the available memory area

(which has  $N$  addresses  $AD_1$ - $AD_N$ ) for recorded signal registration in built-in memory 8A in control unit 7A. The text information registration operation, music signal registration operation, and desired CD search operation will be explained below by referring to these figures. Note that individual CDs  $2_1$ - $2_N$  (the subscript is a disc number for distinguishing CDs) are held in the holding locations in pallet numbers 1- $N$  in holding unit 1, and nothing is as yet stored in memory unit 7A. Also,  $N = 75$ .

[0010]

#### (1) Text information registration

To register text information, i.e., the title, genre and artist name that represent recorded content, for CD  $2_2$  in pallet number 2, for example, held in holding unit 1, the register text information mode key on operation unit 6A is pressed. Then, control unit 7A goes to register text information mode (steps S30 and S31 in Figure 4). Then when 2 is entered with the ten-key pad on operating unit 6A to select the desired CD disc number,  $n = 2$  is registered (steps S32 and S33). Next, when the title key is pressed with operating unit 6A, control unit 7A goes to title input mode (steps S34 and S35). At this stage, when text representing the title, for example, "HOPE HAS A PLACE," is entered using the character keys on operating unit 6A, and the confirm key (ENTER) is pressed to confirm, the text input here is stored as the title data  $TD_2$  for disc number 2 is stored in memory unit 7A [sic; 9A] (steps S50 and S51 in Figure 5). Next, when the genre key is pressed with operating unit 6A, control unit 7A goes to genre input mode (steps S36 and S37 in Figure 4). At this stage, when text, for example "JAZZ," is input using the character keys on operating unit 6A and the confirm key is entered to confirm, the text input here is stored as genre data  $JD_2$  for disc number 2 in memory unit 7A [sic; 9A] (steps S50 and S51 in Figure 5). When the artist key is pressed in the same way with operating unit 6A, control unit 7A goes to artist name input mode (steps S38 and S39 in Figure 4). At this stage, when text representing the artist name is input using the character keys on operating unit 6A and the confirm key is pressed to confirm, the text input here is stored as artist name data  $AD_2$  for disc number 2 in memory unit 7A [sic; 9A] (steps S50 and S51 in Figure 5). If text information input for desired CD  $2_2$  is ended, when the end key on operating unit 6A is pressed, control unit 7A determines YES at step S53 and returns to step S32 in Figure 4. If there are additional CDs for which text information is to be registered, it is registered in the same way. If there are no other CDs to be registered, the register text information mode key is pressed. Then control unit 7A cancels register text information mode (steps S40 and S41 in Figure 4). Text information can be registered only for the user's desired CDs in this way, and the preferred text information can be registered for the individual CDs, so it is also possible to change the

registration for the text information appropriate to a new CD when the CD in a certain pallet number  $i$  is removed.

[0011]

## (2) Music signal registration

To register a part of the recorded music signal for CD  $2_2$  in pallet number 2, for example, held in holding unit 1, the register music signal mode key on operating unit 6A is pressed. Then, control unit 7A goes to register music signal mode (steps S60 and S61 in Figure 6), and the available storage area for music signal registration in built-in memory 8A is cleared (step S62). At this stage, when 2 is input with the ten-key pad on operating unit 6A and disc number  $n$  as the desired CD is selected, control unit 7A additionally registers the music signal in the memory region for music signal registration (steps S63 and S64. Refer to address  $AD_1$  in Figure 3). If there are other CDs for which the music signal is to be registered, they are registered with the same operation. Figure 3 indicates a state where 5, 10 and 3 are additionally registered at addresses  $AD_2$ ,  $AD_3$  and  $AD_4$ , following disc number 2. If there are no other CDs to register, the register music signal mode key is pressed. Then control unit 7A cancels register music signal mode (steps S65 and S66 in Figure 6). The music signals to be registered can be registered only for the user's desired CDs in this way.

[0012]

Control unit 7A checks whether at least one disc number has been registered in the storage area for music signal registration, in the music signal registration processing in Figure 13 (step S200). For example, when the user registers disc number 2, YES is determined at step S200. In this case, control unit 7A considers the first disc number present in the memory area for music signal registration to be  $i$  (step S201). Here,  $i = 2$ . Then, switch 11 is switched to side a (step S202), exchange unit 4 is controlled, CD  $2_2$  where disc number  $i = 2$  is taken out of holding unit 1 and it is placed in CD playback unit 3 (step S203). Then CD playback unit 3 is controlled, TOC information in the lead-in area is read and input, and it is stored in built-in memory 8A in control unit 7A (step S204). Then the beginning of the first song is searched for by referring to said TOC information, and playback is started after the search (step S205). Then, memory unit 9A is controlled, 10 sec of the digital music signal output from CD playback unit 3 is correlated to disc number  $i = 2$ , and it is registered saved as music signal data  $MD_2$  (step S206). At the point where 10 sec passes after playback start, CD playback unit 3 is controlled, and playback is stopped (step S207). Exchange unit 4 is controlled, and the currently desired CD  $2_2$  is returned from CD playback unit 3 to the original holding location in holding unit 1 (step S208). Then, disc number  $i = 2$ , for which registration of the current music signal is ended, is deleted from the

memory area for music signal registration (step S209). Then, returning again to step S200, the same registration operation is performed if there is still another disc number in the memory area for music signal registration. In the case of Figure 3, 10 sec of the digital music signal read from the beginning of the first song for CD 2<sub>2</sub>, CD 2<sub>5</sub>, CD 2<sub>10</sub> and CD 2<sub>3</sub> is registered as MD<sub>2</sub>, MD<sub>5</sub>, MD<sub>10</sub> and MD<sub>3</sub>. Note that with this embodiment, music signal registration and text information registration are performed independently, so when a CD in a certain pallet number *i* is replaced and it is all right to leave the text information registered for the previous CD, the text information input operation can be skipped.

[0013]

Below, where text information for title data TD<sub>1</sub>-TD<sub>N</sub>, genre data JD<sub>1</sub>-JD<sub>N</sub>, and artist name data AD<sub>1</sub>-AD<sub>N</sub>, and music signal data MD<sub>1</sub>-MD<sub>N</sub> has been registered for all CD 2<sub>1</sub> – CD 2<sub>N</sub> in memory unit 9A, and not even one disc number has been registered in the memory area for music signal registration in built-in memory 8A will be explained. In addition, when a title list is displayed on display unit 10, the number of titles that can be displayed will be B, and here B = 10.

#### (4) Search all

To find and play a desired CD from among all the CDs held in holding unit 1, the search all mode key on operating unit 6A is pressed. Then, control unit 7A checks whether a disc number is present in the memory area for music signal registration (steps S70 and S701 in Figure 7). It is NO, so switch 11 is switched to side b (side to output digital music signal in memory unit 9A) (step S72), memory unit 9A is referenced, and the number of all CDs for which a title has been registered is set as K (step S73). Here, K = N = 175. Next, a, representing the number of pages of the title list, is set to 1 (step S74), and whether a x B is K or less is checked (step S75). Initially it is YES, so from the K = N titles registered in memory unit 9A, from the first to the B = 10th are correlated to title numbers 01-10 and are displayed as a list on display unit 10 (step S76. Refer to Figure 27).

[0014]

If there is a title thought to be the desired CD in said list display on operating unit 6A, the user selects said desired title by inputting the title number correlated to said desired title with the ten-key pad. For example, if the fifth "CHAIN LIGHTNING" is the one, 05 is input. Then, control unit 7A determines YES at step S90 in Figure 8, memory unit 9A is controlled, reading from the beginning of the music signal data MD<sub>5</sub> registered for the same CD as the desired title here is started, and output of the digital music signal is started. Digital music signal MD<sub>5</sub> is

output to D/A converting unit 5 through switch 11, so output of music at the beginning portion of the first song on CD 2<sub>5</sub> starts. Note that if reading of memory unit 9A reaches the end of MD<sub>5</sub>, reading is continued by returning to the beginning. The user can thereby listen to the music registered for the beginning portion of the CD that he guesses to be the desired CD from the title, and can promptly determine whether or not it is really the desired CD.

[0015]

If the music is the desired CD, the OK key on operating unit 6A is pressed and playback is designated. Then, control unit 7A controls memory unit 9A and stops output of the digital music signal by stopping reading of MD<sub>5</sub> (steps S94 and S95). When switch 11 is switched to side a (side for CD playback unit 3), exchange unit 4 is controlled, the desired CD 2<sub>5</sub> to which the current desired title is correlated is taken from holding unit 1 and is placed in CD playback unit 3. Then CD playback unit 3 is controlled, the TOC information in the lead-in area is read and input, and it is stored in built-in memory 8A in control unit 7A. Then, the beginning of the first song is searched for by referring to said TOC information, and playback is started after the search (steps S96-S98). The digital music signal output from CD playback unit 3 undergoes D/A conversion with D/A converting unit 5, and is output externally. During playback, control unit 7A accepts input of subcodes from CD playback unit 3, compares with the TOC information, and determines when playback has reached the end of the last song. If playback reaches the end of the last song, CD playback unit 3 is controlled to stop playback, and exchange unit 4 is controlled to return CD 2<sub>5</sub> placed in CD playback unit 3 to the original location in holding unit 1 (steps S100-S102). Then, [processing] returns to step S77 in Figure 7. If there are no other CDs to be listened to, when the cancel key on operating unit 6A is pressed, control unit 7A determines YES at step S103 in Figure 8, the list display of titles by display unit 10 is stopped (step S104), and switch 11 is switched to side a to return to step S30 in Figure 4 (step S105).

[0016]

If, after returning to step S77 in Figure 7, there is another CD to be listened to, but the title of the desired CD does not appear in the current title list display, the next page key on operating unit 6A is pressed. Then, control unit 7A determines YES at step S77, and  $a \times B = 10$  is still smaller than K (YES at step S78), so a is set to 2 (step S79). Then, returning to step S75,  $a \times B$  is still no more than K (YES at step S75), so memory unit 9A is referenced, and from the K = 75 titles, the 11-20th are displayed as a list along with title numbers 11-20 (step S76). If the desired CD does not appear among these, when the next page key on operating unit 6A is pressed again, from the K = 175 titles, the 21-30th are displayed as a list along with title numbers 21-30 (steps S78, S79, S75, S76, S77). Each time the next page key is pressed, a list of the next 10

titles is displayed. However, when the next page key is pressed a total of 17 times, control unit 7A determines NO at step S75 and proceeds to step S80, and from the  $K = 175$  titles, the 171-175th are displayed in a list along with title numbers 01-05. Then, when the title of the desired CD has not appeared, if the cancel key on operating unit 6A is pressed, control unit 7A stops the list display by display unit 10 (steps S103-S105), and switch 11 is switched to side a to return to step S30 in Figure 4.

[0017]

#### (5) Searching by genre

Unlike the above, to find and play the desired CD from the desired genre, from all the CDs held in holding unit 1, the search by genre mode key on operating unit 6A is pressed. Then control unit 7A checks whether there is a disc number present in the memory area for music signal registration (steps S110 and S111 in Figure 9). If NO, it waits for the desired title to be input with operating unit 6A (step S112). If that is input, switch 11 is switched to side b (side for output of digital music signal from memory unit 9A) (step S113), storage unit 9A is referenced, and the number of all CDs for which a title is registered and that are CDs for which the genre matches the desired genre is set as  $K$  (step S114). Next,  $a$ , representing the number of pages of the title list, is set to 1 (step S115), and whether  $a \times B$  is  $K$  or less is checked (step S116). If YES, memory unit 9A is referenced, and from the titles of the CDs for which the genre matches the desired genre, from the first to the  $B = 10$ th are displayed as a list on display unit 10 correlated to title numbers 01-10 (step S117).

[0018]

If the title thought to be the desired CD is in said list display, when said desired title is selected with operating unit 6A, control unit 7A determines YES at step S130 in Figure 10, memory unit 9A is controlled, reading from the beginning of music signal data  $MD_i$  registered for the same CD as the desired title name selected here is started, and output of the digital music signal is started (step S131). The user can thereby hear the music recorded on the beginning portion of the CD he guesses to be the desired CD from the title, and can promptly determine whether or not it is really the desired CD. Furthermore, the desired title name can be selected from those narrowed to the desired genre, so selection of the desired title is easy.

[0019]

If the music is the desired CD, when the OK key on operating unit 6A is pressed, control unit 7A stops the reading from memory unit 9A (steps S134 and S135), and after switch 11 is switched to side a (step S136), exchange unit 4 is controlled, the desired CD  $2_i$  to which the



current desired title is correlated is taken from holding unit 1 and placed in CD playback unit 3, and it is played back from the beginning of the first song (steps S137-S139). The digital music signal output from CD playback unit 3 undergoes D/A conversion with D/A converting unit 5 and is output externally. If playback reaches the end of the last song, playback is stopped, and CD 2<sub>i</sub> placed in CD playback unit 3 is returned to the original location in holding unit 1 (steps S140-S142). [Processing] returns to step S118 in Figure 9. If there is no other CD to be listened to, when the cancel key on operating unit 6A is pressed, control unit 7A determines YES at step S143 in Figure 10, the title list display by display unit 10 is stopped (step S144), and switch 11 is switched to side a to return to step S30 in Figure 4 (step S145).

[0020]

If after returning to step S118 in Figure 9 there is another CD to be listened to, but the desired CD title does not appear on the current title list display, the next page key on operating unit 6A is pressed. Then, control unit 7A determines YES at step S118, and if  $a \times B = 10$  is still smaller than K (YES at step S119), a is set to 2 (step S120). Then, returning to step S116, if  $a \times B$  is still K or less, memory unit 9A is referenced, and from the K CDs for which the title is registered and that are CDs for which the genre matches the desired genre, the titles of the 11-20th are displayed as a list (step S117). If  $a \times B > K$ , NO is determined at step S116, and proceeding to step S121, of the K units, the 11-Kth are displayed as a list. Then, when the desired CD title does not appear, if the cancel key on operating unit 6A is pressed, control unit 7A stops the list display by display unit 10 (steps S143-S145), and switch 11 is switched to side a to return to step S30 in Figure 4. Note that pressing the cancel key with NO at step S111 in Figure 9 also returns to step S30 (step S122).

[0021]

#### (6) Searching by artist name

Unlike the above, to find and play the desired CD from the desired artist, from all the CDs held in holding unit 1, the search by artist mode key on operating unit 6A is pressed. Then control unit 7A checks whether there is a disc number present in the memory area for music signal registration (steps S150 and S151 in Figure 11). If NO, it waits for the desired artist name to be input with operating unit 6A (step S152). If that is input, switch 11 is switched to side b (side for output of digital music signal from memory unit 9A) (step S153), storage unit 9A is referenced, and the number of all CDs for which a title is registered and that are CDs for which the artist name matches the desired artist is set as K (step S154). Next, a, representing the number of pages of the title list, is set to 1 (step S155), and whether  $a \times B$  is K or less is checked (step S156). If YES, memory unit 9A is referenced, and from the titles of the CDs for which the

artist name matches the desired artist, from the first to the  $B = 10$ th are displayed as a list on display unit 10 correlated to title numbers 01-10 (step S157).

[0022]

If the title thought to be the desired CD is in said list display, when said desired title is selected with operating unit 6A, control unit 7A determines YES at step S170 in Figure 12, memory unit 9A is controlled, reading from the beginning of music signal data  $MD_i$  registered for the same CD as the desired title name selected here is started, and output of the digital music signal is started (step S171). The user can thereby hear the music recorded on the beginning portion of the CD he guesses to be the desired CD from the title, and can promptly determine whether or not it is really the desired CD. Furthermore, the desired title name can be selected from those narrowed to the desired artist, so selection of the desired title is easy.

[0023]

If the music is the desired CD, when the OK key on operating unit 6A is pressed, control unit 7A stops the reading from memory unit 9A (steps S174 and S175), and after switch 11 is switched to side a (step S176), exchange unit 4 is controlled, the desired CD  $2_i$  to which the current desired title is correlated is taken from holding unit 1 and placed in CD playback unit 3, and it is played back from the beginning of the first song (steps S177-S179). The digital music signal output from CD playback unit 3 undergoes D/A conversion with D/A converting unit 5 and is output externally. If playback reaches the end of the last song, playback is stopped, and CD  $2_i$  placed in CD playback unit 3 is returned to the original location in holding unit 1 (steps S180-S182). [Processing] returns to step S158 in Figure 12. If there is no other CD to be listened to, when the cancel key on operating unit 6A is pressed, control unit 7A determines YES at step S183 in Figure 12, the title list display by display unit 10 is stopped (step S184), and switch 11 is switched to side a to return to step S30 in Figure 4 (step S185).

[0024]

If after returning to step S158 in Figure 11 there is another CD to be listened to, but the desired CD title does not appear on the current title list display, the next page key on operating unit 6A is pressed. Then, control unit 7A determines YES at step S158, and if  $a \times B = 10$  is still smaller than K (YES at step S159), a is set to 2 (step S160). Then, returning to step S156, if  $a \times B$  is still K or less, memory unit 9A is referenced, and from the K CDs for which the title is registered and that are CDs for which the artist name matches the desired genre [sic; artist], the titles of the 11-20th are displayed as a list (step S157). If  $a \times B > K$ , NO is determined at step S156, and proceeding to step S161, of the K units, the 11-Kth are displayed as a list. Then, when

the desired CD title does not appear, if the cancel key on operating unit 6A is pressed, control unit 7A stops the list display by display unit 10 (steps S183-S185), and switch 11 is switched to side a to return to step S30 in Figure 4. Note that pressing the cancel key with NO at step S51 in Figure 11 also returns to step S30 (step S162).

[0025]

With this embodiment, text information, i.e., title, genre and artist name that represent the recorded content, and a part of the music signals for the recorded songs are registered in memory unit 9A correlated to the CDs, for each CD  $2_1$ - CD  $2_N$  held in holding unit 1. In search all mode for the desired CD, the titles of all the CDs for which the title is registered are displayed as a list 10 at a time on display unit 10. When the desired title is selected from those that are displayed, the recorded music signal for the same CD as the desired title is immediately read and output. Thus, the user can see the title, make a rough guess, and immediately confirm whether the selected CD is the one with the desired music content. If it is the desired CD, playback of the CD to which said desired name is correlated can be promptly executed by playback being designated. Preferred text information (title, etc.) can also be registered for individual CDs, so text information appropriate to a new CD can be registered all over when a CD is replaced. Text information registration and music signal registration are also performed independently, so if one only wants to change the text information, the music signal registration operation can be skipped. Or when a CD is replaced and it is all right to leave the text information registered for the previous CD, the text information input operation can be skipped.

[0026]

If a desired genre is input in search by genre mode for the desired CD, titles that have been narrowed to just CDs in the desired genre are displayed as a list, so one may search for the desired title from a group of titles narrowed to the desired genre, and searching for the desired recording medium can be done easily. If the desired artist is input in search by artist mode for the desired CD, titles that have been narrowed to just CDs with the desired artist are displayed as a list, so one may search for the desired title from a group of titles narrowed to the desired artist, and searching for the desired recording medium can be done easily.

[0027]

Note that with the embodiment above, when the search all mode key is pressed, the titles of all CDs for which the titles have been registered, from the CDs held in holding unit 1, are displayed in a list 10 at a time, but they could all be displayed as a list on 1 page, or they could be switched and displayed 1 at a time. With the latter, a next key is provided on operating unit

6A and display unit 10 will change to one-line display (refer to symbol 10A in Figure 15). Then, in the flowcharts in Figures 4-13, the portion in Figure 7 is modified as in Figure 14 (in Figure 14, the same symbols are used for the same steps as in Figure 7). At step S76' after  $a = 1$  at step S74, in particular, control unit 7A displays the first of the titles for all CDs for which the title has been registered with title number 01 (refer to Figure 15 (1)). Then, when said first title is not the desired one, the next key is pressed with operating unit 6A. Then, whether  $a = K$  is checked (steps S77' and S78'),  $a$  is incremented to 2, and the second of the titles is displayed for all CDs for which the title has been registered with title number 01 (steps S79 and S76'. Refer to Figure 15 (2)). If still not the desired one, when the next key is pressed again, the third of the titles is displayed for all CDs for which the title has been registered with title number 01 (steps S77', S78', S79 and S76'. Refer to Figure 15 (3)). Thereafter, each time the next key is pressed, the titles from the fourth one on are displayed switched one at a time. At the point during the process where the title thought to be the desired CD is displayed, when the user inputs 01, which is the title number on the display, with the ten-key pad, and selects the title in the display, control unit 7A reads the digital music signal correlated to the same CD as the desired title (Steps S90 and S91 in Figure 8).

[0028]

In the same way, with the embodiment above, when the search by genre mode key is pressed and the desired genre is input, the desired titles are registered, from the CDs held in holding unit 1, and all the CDs for which the desired genre is registered and the title is registered are displayed in a list 10 at a time, but they could also all be displayed as a list on 1 page, or they could be switched and displayed 1 at a time. With the latter, a next key is provided in place of the next page key on operating unit 6A. In the flowcharts in Figures 4-13, the portion for Figure 9 is modified as in Figure 16 (in Figure 16, the same symbols are used for the same steps as in Figure 9). At step S117', after  $a = 1$  at step S115 in particular, control unit 7A displays the first of the titles for all the CDs in the desired genre and for which the title has been registered with the title number 01. Then, when said first title is not the desired one, the next key is pressed with operating unit 6A. Then, whether  $a = K$  is checked (steps S118' and S119'),  $a$  is incremented to 2, and the second of the titles for all CDs in the desired genre and for which the title has been registered is displayed with title number 01 (steps S120, S117'). If still not the desired one, when the next key is pressed again, the third of the titles for all CDs in the desired genre and for which the title has been registered is displayed with title number 01 (steps S118', S119', S120 and S117'). Thereafter, in the same way, each time the next key is pressed, from the fourth on of all CDs in the desired genre and for which the title has been registered are displayed one at a time. At the point during the process where the title thought to be the desired CD is displayed, when

the user inputs 01, which is the title number on the display, and selects the title on the display, control unit 7A reads the digital music signal correlated to the same CD as the desired title (Steps S130 and S131 in Figure 10).

[0029]

In the same way, with the embodiment above, when the search by artist mode key is pressed and the artist is input, the desired titles are registered, from the CDs held in holding unit 1, and all the CDs for which the desired artist name is registered and the title is registered are displayed in a list 10 at a time, but they could also all be displayed as a list on 1 page, or they could be switched and displayed 1 at a time. With the latter, in the flowcharts in Figures 4-13, the portion for Figure 11 is modified as in Figure 17 (in Figure 17, the same symbols are used for the same steps as in Figure 11). At step S157', after  $a = 1$  at step S155 in particular, control unit 7A displays the first of the titles for all the CDs with the desired artist name and for which the title has been registered with the title number 01. Then, when said first title is not the desired one, the next key is pressed with operating unit 6A. Then, whether  $a = K$  is checked (steps S158' and S159'),  $a$  is incremented to 2, and the second of the titles for all CDs with the desired artist name and for which the title has been registered is displayed with title number 01 (steps S120, S117'). If still not the desired one, when the next key is pressed again, the third of the titles for all CDs with the desired artist name and for which the title has been registered is displayed with title number 01 (steps S158', S159', S160 and S157'). Thereafter, in the same way, each time the next key is pressed, from the fourth on of all CDs with the desired artist name and for which the title has been registered are displayed one at a time. At the point during the process where the title thought to be the desired CD is displayed, when the user inputs 01 and selects the title on the display, control unit 7A reads the digital music signal correlated to the same CD as the desired title (Steps S170 and S171 in Figure 12).

[0030]

In addition, with the embodiment above, CDs for which the music signal will be registered can be designated one at a time by user selection, but all the CDs held in holding unit 1 could be designated at the same time, or only the CDs for which the title has been registered could be designated at the same time. With the former, in the flowcharts in Figures 4-13, for example, the portion in Figure 5 is modified as in Figure 18 (in Figure 18, the same symbols are used for the same steps as in Figure 5). If the register music signal mode key is pressed with operating unit 6A, control unit 7A goes to register music signal mode (steps S60 and S61 in Figure 18). After the memory area for music signal registration in built-in memory 8A is cleared, disc numbers 1 to N are all registered (steps S62 and S67), and then the register music signal

mode is cancelled (step S66). By from 1 to N being registered in the memory area for music signal registration, control unit 7A thereafter places from CD  $2_1$  to  $2_N$  in CD playback unit 3 while exchanging them in succession, according to the processing in Figure 13, and the music signal obtained by playing the first 10 sec of the first song is registered. So it is not necessary for the user to designate what to register one at a time. With the latter, in the flowcharts in Figures 4-13, for example, the portion in Figure 5 is modified as in Figure 19 (in Figure 19, the same symbols are used for the same steps as in Figure 5). If the register music signal mode key is pressed with operating unit 6A, control unit 7A goes to register music signal mode (steps S60 and S61 in Figure 19). After the memory area for music signal registration in built-in memory 8A is cleared, memory unit 9A is referenced and the disc numbers for all the CDs for which the title has been registered are registered (steps S62 and S68). Then the register music signal mode is canceled (step S66). Control unit 7A thereafter places all the CDs for which the title is registered that are held in holding unit 1 in CD playback unit 3 while exchanging them in succession, according to the processing in Figure 13, and the music signal obtained by playing the first 10 sec of the first song is registered. So it is not necessary for the user to designate what to register one at a time.

[0031]

In addition, with the embodiment above, text information registration and music signal registration are performed independently, but if text information is registered for a certain CD, the music signal could also be registered automatically for the same CD. Specifically, on operating unit 6A, in place of a register text information key and a register music signal key, a register guide information key is provided, and in the flowcharts in Figure 4-13, the portions in Figure 4 and Figure 6 are modified as in Figure 20 (in Figure 20, the same symbols are used for the same steps as in Figure 4). When the register guide information key is pressed with operating unit 6A, control unit 7A goes to register guide information mode (steps S30' and S31' in Figure 20), and the memory area for music signal registration in built-in memory 8A is cleared (step S42). Then, when a CD for which registration of text information and a music signal is desired is selected by inputting of the desired disc number (step S32), using said selected disc number as n, n is added to the memory area for music signal registration (steps S33 and S43).

[0032]

Then, the title key is pressed to switch to title input mode (steps S34 and S35), and the preferred title for CD  $2_n$  is input as text to be registered as the title of CD  $2_n$  (steps S50 and S51 in Figure 5). Next, the genre key is pressed to switch to genre input mode (steps S36 and S37 in Figure 20), and the genre is input as text to register as the genre for CD  $2_n$  (steps S50 and S51 in

Figure 5). The artist key is additionally pressed to switch to artist name input mode (steps S38 and S39), and the artist name is entered as text to register as the artist name for CD  $2_n$  (steps S50 and S51 in Figure 5). While text information for the desired CD  $2_n$  is being input in this way,  $n$  is added to the memory area for music signal registration by control unit 7A. So CD  $2_n$ , for which text information is to be registered currently, is taken from holding unit 1 and placed in CD playback unit 3, and the music signal obtained by playing the first 10 sec of the first song is registered in memory unit 9A according to the processing in Figure 13. The result is that even music signal registration can be completed just by the user inputting text information for desired CD  $2_n$ , and effort to register the music signal is reduced. Note that processing at step S43 in Figure 20 will be performed with YES at step S53 in Figure 5, and it would then be all right to be return to step S32 in Figure 20.

[0033]

In addition, with the embodiment above, registration processing for the music signals recorded on the CDs is performed separately from playback processing to listen to the desired CD, so it is not possible to listen to the desired CD until the music signal registration processing is completed, but the registration processing of the music signal on said desired CD could also be executed during playback processing of the desired CD. For example, a normal play mode key is provided for operating unit 6A, and in the flowcharts in Figures 4-13, the portion in Figure 5 is modified as in Figure 21 and Figure 13 is omitted. In Figure 21, when the user wants to listen to a certain disc, CD  $2_3$  which is 3, for example, he presses the normal play mode key with operating unit 6A. Then, control unit 7A goes to normal play mode (steps S220 and S221). When 3 is input with operating unit 6A and the CD disc number for which playback is desired is selected,  $i = 3$  is set (steps S222 and S223) and switch 11 is switched to side a (step S224). Then control unit 7A controls exchange unit 4, CD  $2_3$  for which listening is desired is taken from holding unit 1, and it is placed in CD playback unit 3 (step S225). Then, CD playback unit 3 is controlled, the TOC information is read and stored in built-in memory 8A (step S226), the TOC information is referenced to control CD playback unit 3, the beginning of the first song is searched for, and playback is started after the search (step S227). The digital music signal output from CD playback unit 3 is input to D/A converting unit 5 through switch 11 and is converted to an analog music signal and output, so user can listen to the music on the desired CD.

[0034]

When control unit 7A starts playback from the beginning of the first song on CD  $2_3$ , memory unit 9A is controlled, and 10 sec of the digital music signal output from CD playback unit 3 is stored correlated to the current desired CD  $2_3$  (step S228). Then, the subcode input from

CD playback unit 3 is compared with the TOC information, and a check as to whether playback has reached the end of the last song is repeated (step S229). If YES, CD playback unit 3 is controlled to stop playback (step S230), and exchange unit 4 is controlled to return CD 2<sub>3</sub> to the original holding location in holding unit 1 (step S231). After this, when the user selects the disc number of another desired CD 2<sub>i</sub>, said desired CD 2<sub>i</sub> is taken from holding unit 1, it is placed in CD playback unit 3, and it is played from the beginning of the first song to the end of the last song (steps S222-S227) in exactly the same way. Then, during this, when playback is started from the beginning of the first song, memory unit 9A is controlled, and only 10 sec of the digital music signal output from CD playback unit 3 is stored correlated to desired CD 2<sub>i</sub> (step S228). If playback reaches the end of the last song, playback is stopped (steps S229 and S230), and exchange unit 4 returns CD 2<sub>3</sub> to the original holding location in holding unit 1 (step S231). With the example in Figure 21, while the user is listening to the desired CD, a part of the music signal recorded on the desired CD is automatically registered, so the user need not specifically register the music signal, which reduces effort. Note that in Figure 23, when the normal play mode key is pressed in normal play mode, control unit 7A cancels the normal play mode and returns to step S30 in Figure 4 (steps S232 and S233).

[0035]

In addition, with the embodiment above and the variation in Figure 21, the music signal registration is for 10 sec from the beginning of the first song on the CD to be registered, but it could also be accomplished for any location designated by the user within the CD to be registered. Specifically, for example, a registration start key is provided for operating unit 6A, and Figure 13 is modified as in Figure 22 (in Figure 22, the same symbols are used for the same steps as in Figure 13). In particular, after playback from the beginning of the first song on CD 2<sub>i</sub> to be registered is started at step S205, the user presses the registration start key when any playback location he wants to register is reached. Then, control unit 7A controls memory unit 9A, and only 10 sec of the digital music signal output from CD playback unit 3, from the point where the registration start key is pressed, is stored correlated to the desired CD 2<sub>i</sub> (steps S240 and S206). After this, if playback reaches the end of the last song, playback is stopped (step S207), and exchange unit 4 is controlled to return CD 2<sub>i</sub> to the original holding location in holding unit 1 (step S208). Figure 21 is also modified as in Figure 23 (in Figure 23, the same symbols are used for the same steps as in Figure 21). In particular, after playback is started from the beginning of the first song on CD 2<sub>i</sub> to be registered at step S227, the user presses the registration start key when any playback location he wants to register is reached. Then, control unit 7A controls memory unit 9A, and only 10 sec of the digital music signal output from CD playback unit 3, from the point where the registration start key is pressed, is stored correlated to the



desired CD 2<sub>i</sub> (steps S250 and S228). After this, if playback reaches the end of the last song, playback is stopped (step S229 and S230), and exchange unit 4 is controlled to return CD 2<sub>i</sub> to the original holding location in holding unit 1 (step S231). With the example in Figures 22 and 23, the music signal at any desired location that is recorded on the CD to be registered can be registered, so the portion that is easiest to recognize can be registered, and whether or not it is the desired CD can be determined when searching.

[0036]

Note that with the embodiment and variations above, cases where CDs are played were explained as examples, but application is also possible to changer-type MD (minidisc) players, or changer-type DVD (digital versatile disc) players that use MDs (minidisc) or DVDs (digital versatile disc) as the recording medium.

[0037]

Effects of the invention

With this invention, when searching the recording mediums, text information associated with the recorded content stored on the individual recording mediums in the holding means that is stored in a recording medium guide information memory means is displayed as a list, or the display is switched. When the user selects the desired text information from said display, the music signal correlated to the same recording medium as said desired recording medium is immediately read from the recording medium guide information memory means, so the user can immediately determine whether the recording medium selected with a rough guess from the text information is the one with the desired recorded content. If it is the desired recording medium, playback of the recording medium correlated to said desired text information can be executed quickly by playback being designated.

#### Brief description of the figures

Figure 1 is a block diagram showing the configuration of a changer-type CD player that pertains to one embodiment of the present invention.

Figure 2 is a diagram explaining the stored content in the memory unit in Figure 1.

Figure 3 is a diagram explaining the stored content in the memory area for music signal registration provided in a built-in memory in the control unit in Figure 1.

Figure 4 is a flowchart showing the main processing by the control part in Figure 1.

Figure 5 is a flowchart showing the main processing by the control part in Figure 1.

Figure 6 is a flowchart showing the main processing by the control part in Figure 1.

Figure 7 is a flowchart showing the main processing by the control part in Figure 1.

Figure 8 is a flowchart showing the main processing by the control part in Figure 1.

Figure 9 is a flowchart showing the main processing by the control part in Figure 1.

Figure 10 is a flowchart showing the main processing by the control part in Figure 1.

Figure 11 is a flowchart showing the main processing by the control part in Figure 1.

Figure 12 is a flowchart showing the main processing by the control part in Figure 1.

Figure 13 is a flowchart showing music signal registration processing by the control unit in Figure 1.

Figure 14 is a flowchart showing a variation of Figure 7.

Figure 15 is an explanatory diagram showing a title display example.

Figure 16 is a flowchart showing a variation of Figure 9.

Figure 17 is a flowchart showing a variation of Figure 11.

Figure 18 is a flowchart showing a variation of Figure 5.

Figure 19 is a flowchart showing another variation of Figure 5.

Figure 20 is a flowchart showing a variation of Figure 4.

Figure 21 is a flowchart showing a variation of Figure 6.

Figure 22 is a flowchart showing a variation of Figure 14.

Figure 23 is a flowchart showing a variation of Figure 21.

Figure 24 is an explanatory diagram showing the configuration of a conventional changer-type CD player.

Figure 25 is a flowchart showing the control processing by the control unit in Figure 24.

Figure 26 is a diagram explaining the stored content in the memory unit in Figure 24.

Figure 27 is an explanatory diagram showing a title display example.

#### Explanation of symbols

1	Holding unit
2 <sub>1</sub> -2 <sub>N</sub>	CD
3	CD playback unit
4	Exchange unit
5	D/A converting unit
6A	Operating unit
7A	Control unit
8A	Built-in memory
9A	Memory unit
10, 10A	Display unit
11	Switch

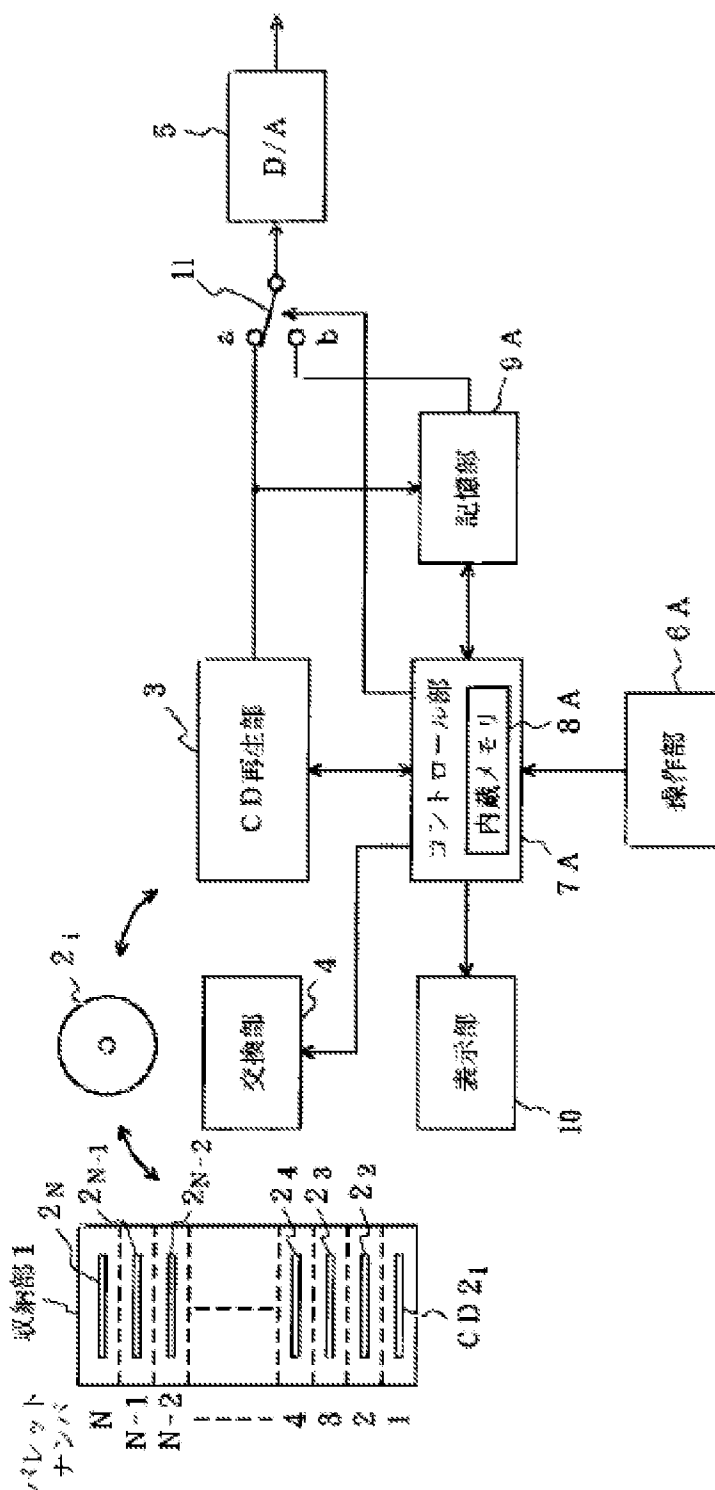


Figure 1

Key: N      Pallet number  
 1      Holding unit  
 3      CD playback unit  
 4      Exchange unit

- 6A Operating unit  
 7A Control unit  
 8A Built-in memory  
 9A Memory unit  
 10 Display unit

① ディスク ナンバー	② タイトル名	③ アーティスト名	④ ジャンル名	⑤ 音楽信号データ
1	$TD_1$	$PD_1$	$ID_1$	$MD_1$
2	$TD_2$	$PD_2$	$ID_2$	$MD_2$
3	$TD_3$	$PD_3$	$ID_3$	$MD_3$
4	$TD_4$	$PD_4$	$ID_4$	$MD_4$
⋮				
$N-2$	$TD_{N-2}$	$PD_{N-2}$	$ID_{N-2}$	$MD_{N-2}$
$N-1$	$TD_{N-1}$	$PD_{N-1}$	$ID_{N-1}$	$MD_{N-1}$
$N$	$TD_N$	$PD_N$	$ID_N$	$MD_N$

図 2 音楽データ

Figure 2

- Key: 1 Disc number  
 2 Title  
 3 Artist name  
 4 Genre  
 5 Music signal data  
 9A Storage unit

① アドレス	② 音楽信号データ
$AD_1$	2
$AD_2$	3
$AD_3$	10
$AD_4$	8
⋮	
$AD_{N-1}$	
$AD_N$	

図 3

Figure 3

Key: A Address  
B Memory area for music signal registration in built-in memory 8A

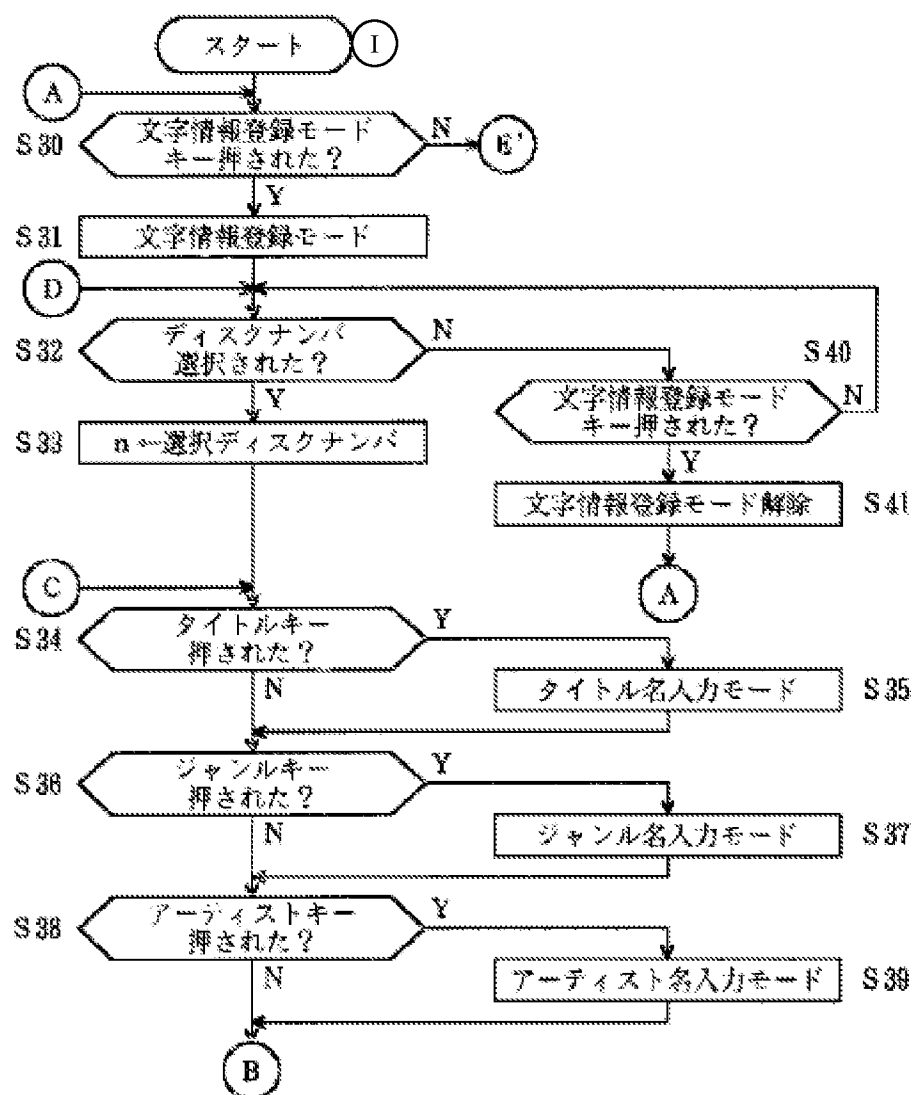


Figure 4

Key:	I	Start
	S30	Register text information mode key pressed?
	S31	Register text information mode
	S32	Disc number selected?
	S33	$n \leftarrow$ selected disk number
	S34	Title key pressed?
	S35	Title input mode
	S36	Genre key pressed?
	S37	Genre input mode
	S38	Artist key pressed?

- S39 Artist name input mode  
 S40 Register text information mode key pressed?  
 S41 Register text information mode canceled

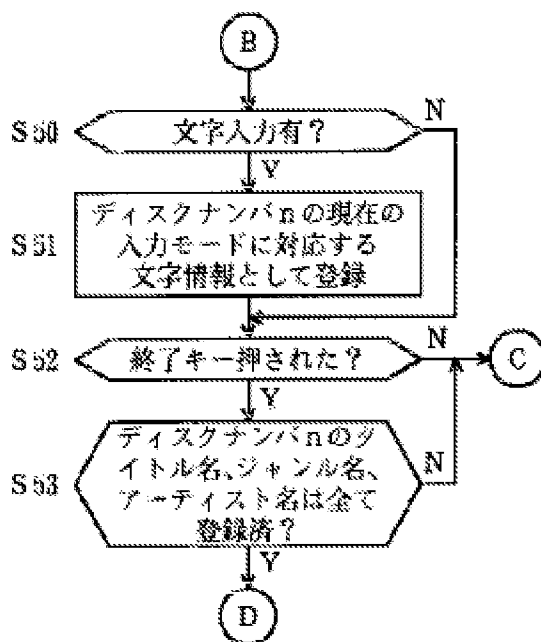


Figure 5

- Key: S50 Is there text input?  
 S51 Register as text information corresponding to disc number n in current input mode  
 S52 End key pressed?  
 S53 Are title, genre and artist name for disc number n all registered?

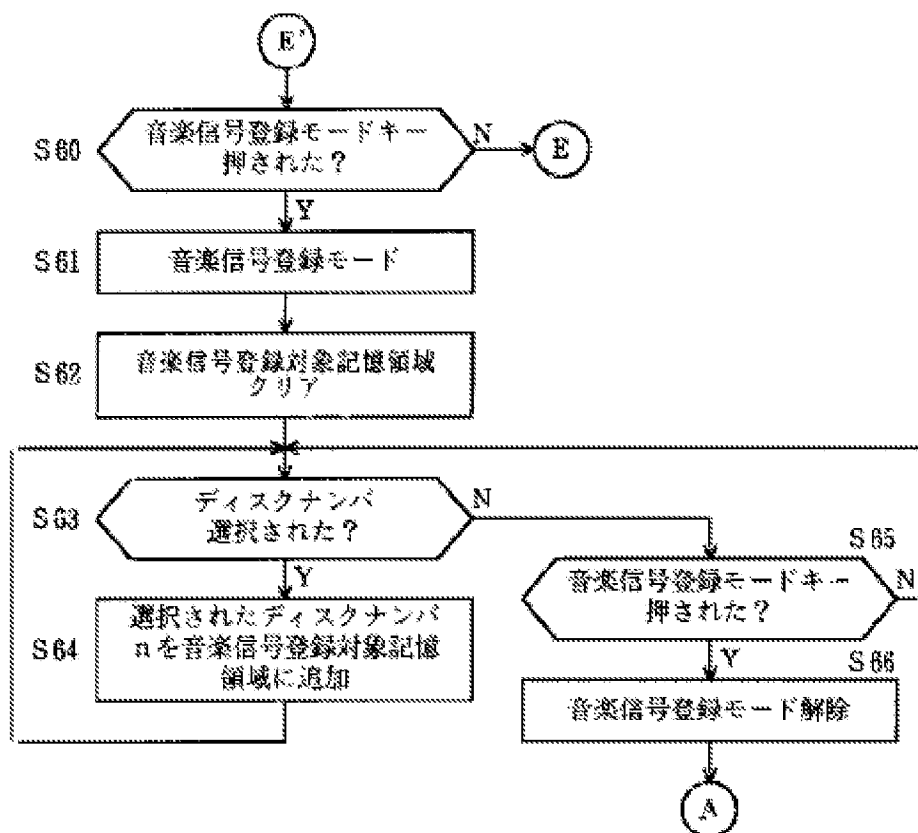


Figure 6

- Key:
- S60 Register music signal mode key pressed?
  - S61 Register music signal mode
  - S62 Clear memory area for music signal registration
  - S63 Disc number selected?
  - S64 Selected disc number n is added to memory area for music signal registration
  - S65 Register music signal mode key pressed?
  - S66 Register music signal mode canceled

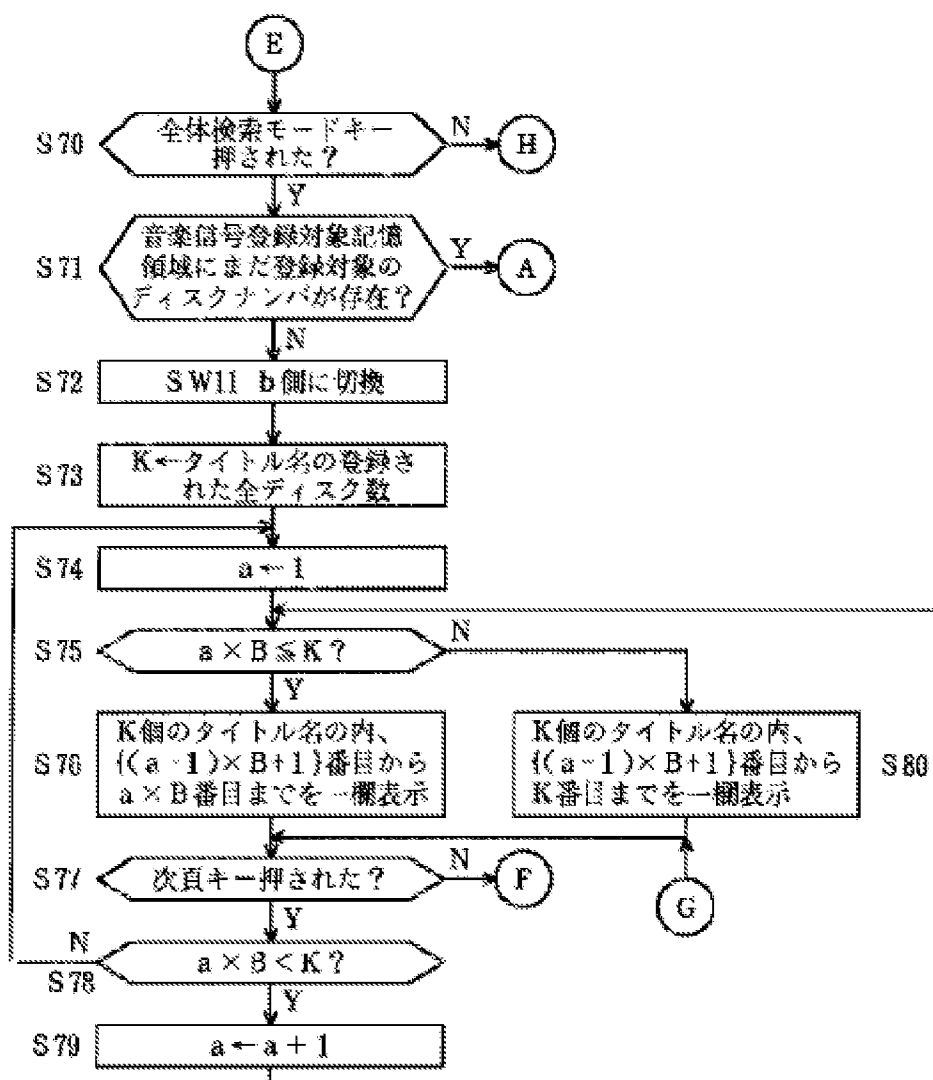


Figure 7

- Key:
- S70 Search all mode key pressed?
  - S71 Is a disc number to be registered still present in memory area for music signal registration?
  - S72 SW 11 switched to side b
  - S73  $K \leftarrow$  number of all discs for which title is registered
  - S76 From K titles, from  $\{(a-1) \times B + 1\}$ th to  $a \times B$ th are displayed as list
  - S77 Next key pressed?
  - S80 From K titles, from  $\{(a-1) \times B + 1\}$ th to Kth are displayed as list



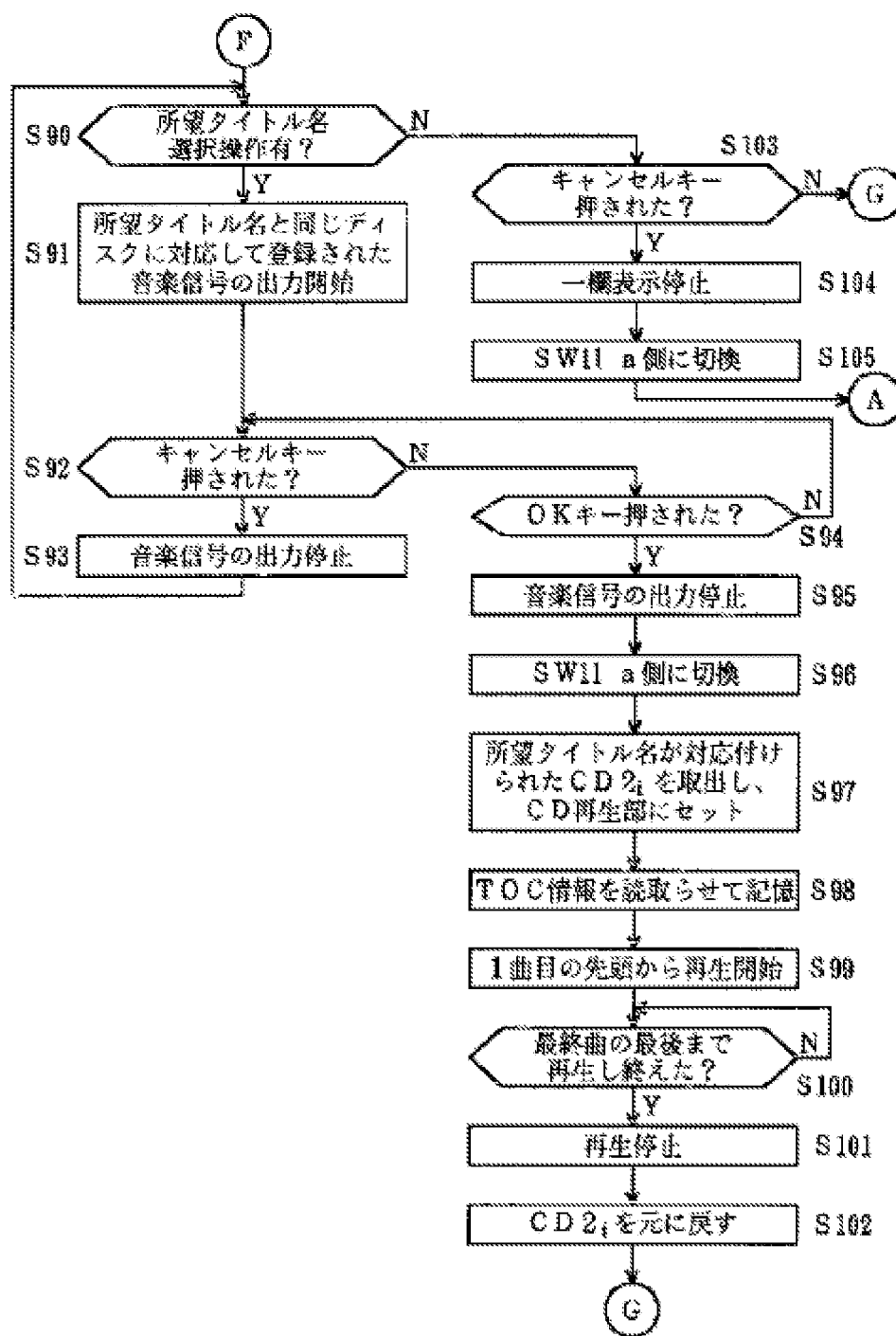


Figure 8

- Key:
- S90 Has desired title been selected?
  - S91 Start output of music signal registered corresponding to same disc as the desired title
  - S92 Cancel key pressed?
  - S93 Stop output of music signal

- S94 OK key pressed?
- S95 Stop output of music signal
- S96 SW 11 switched to side a
- S97 CD 2<sub>i</sub> to which desired title is correlated is taken out and placed in CD playback unit
- S98 TOC information read and stored
- S99 Start playback from beginning of first song
- S100 Has playback reached end of last song?
- S101 Stop playback
- S102 CD 2<sub>i</sub> returned to original position
- S103 Cancel key pressed?
- S104 Stop list display
- S105 SW 11 switched to side a

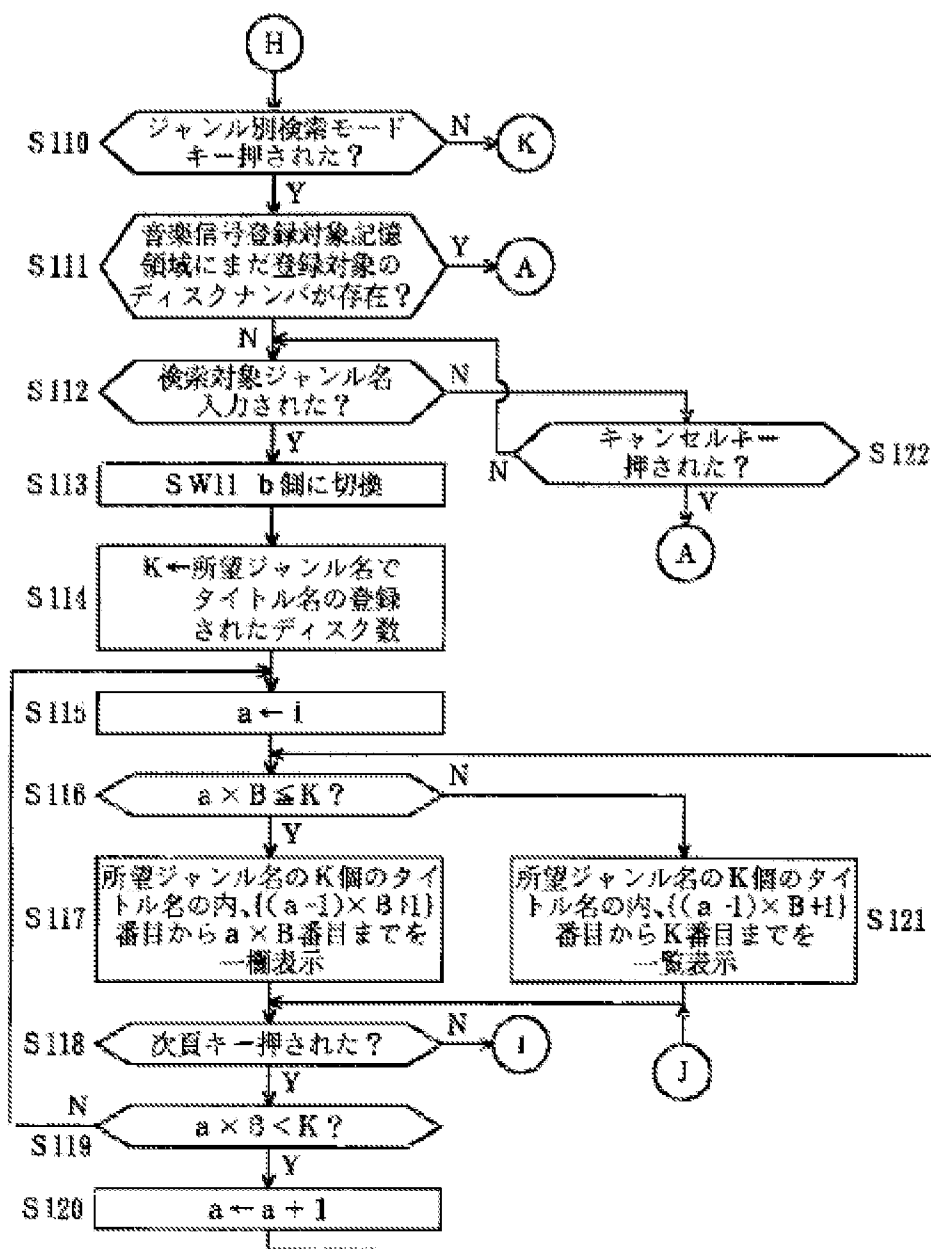


Figure 9

- Key:
- S110 Search by genre mode key pressed?
  - S111 Is a disc number to be registered still present in memory area for music signal registration?
  - S112 Has searched genre been input?
  - S113 SW 11 switched to side b
  - S114  $K \leftarrow$  number of disks in desired genre and for which title is registered
  - S117 From K titles in desired genre, from  $\{(a-1) \times B + 1\}$ th to  $a \times B$ th are displayed as list
  - S118 Next page key pressed?
  - S121 From K titles in desired genre, from  $\{(a-1) \times B + 1\}$ th to Kth are displayed as list

S122 Cancel key pressed?

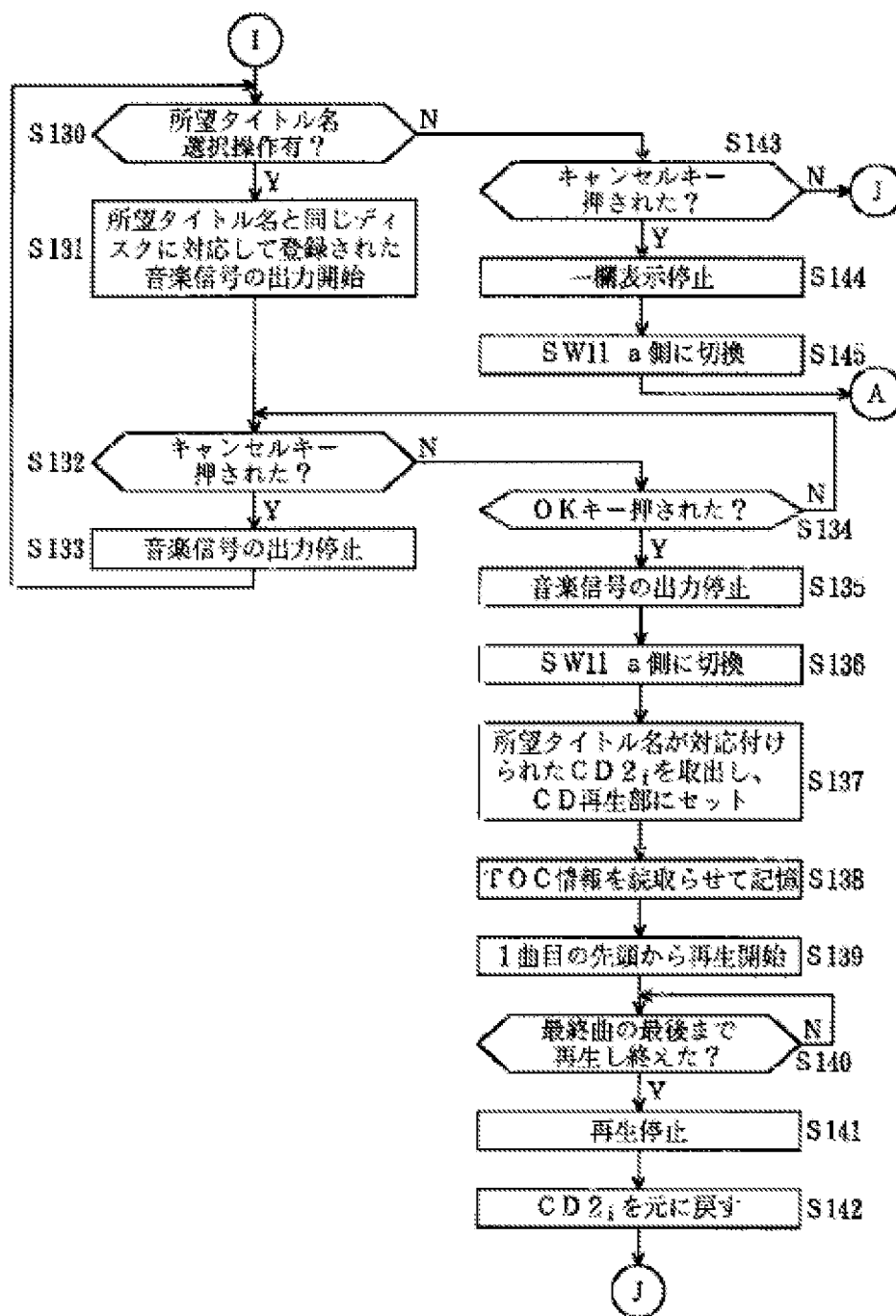


Figure 10

- Key:
- S130 Has desired title been selected?
  - S131 Start output of music signal registered corresponding to same disc as desired title
  - S132 Cancel key pressed?
  - S133 Stop output of music signal

- S134 OK key pressed?
- S135 Stop output of music signal
- S136 SW 11 switched to side a
- S137 CD 2<sub>i</sub> to which desired title is correlated is taken out and placed in CD playback unit
- S138 TOC information read and stored
- S139 Start playback from beginning of first song
- S140 Has playback reached end of last song?
- S141 Stop playback
- S142 CD 2<sub>i</sub> returned to original position
- S143 Cancel key pressed?
- S144 Stop list display
- S145 SW 11 switched to side a

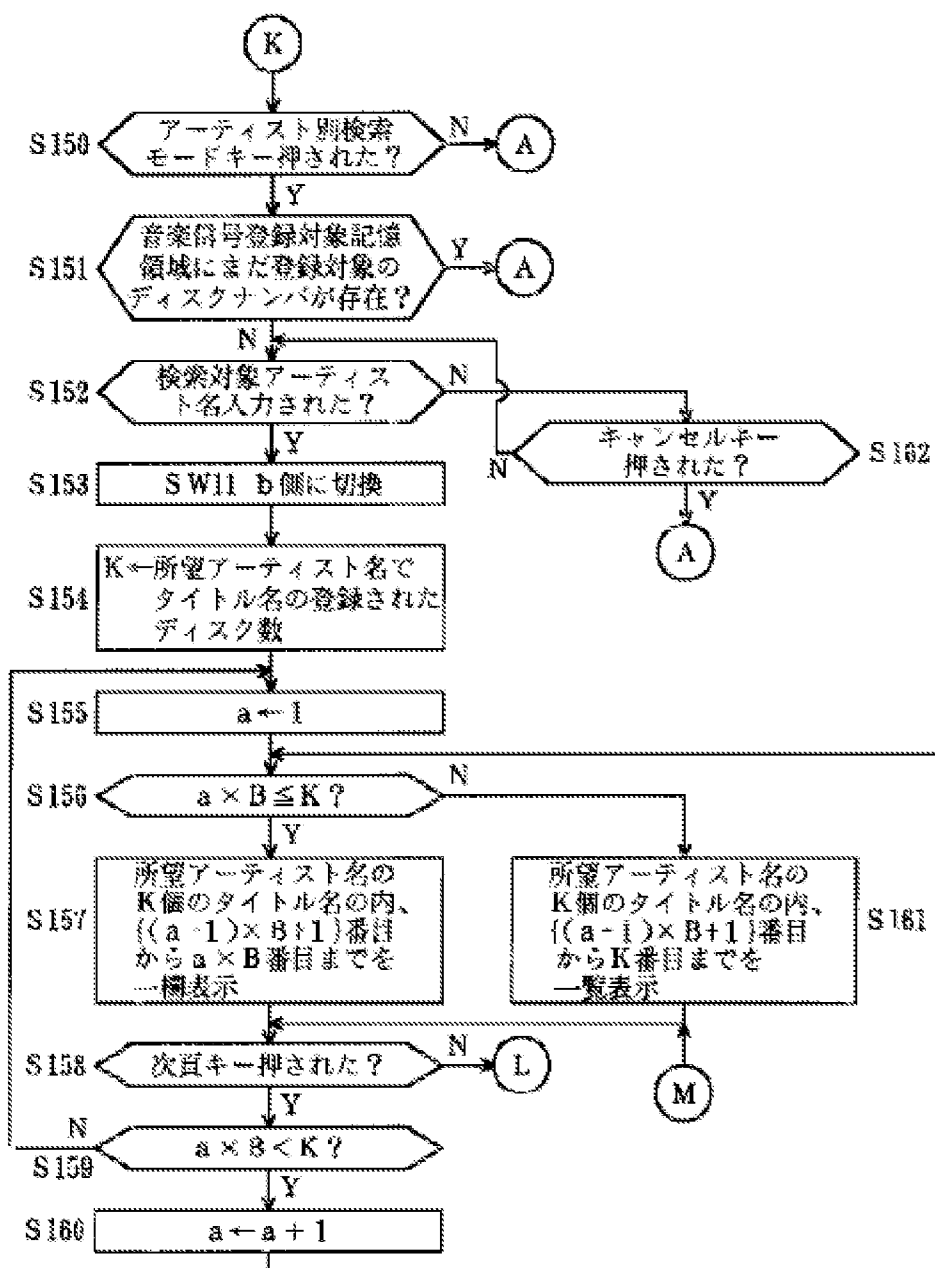


Figure 11

- Key: S150 Search by artist mode key pressed?  
 S151 Is a disc number to be registered still present in memory area for music signal registration?  
 S152 Has searched artist name been input?  
 S153 SW 11 switched to side b  
 S154  $K \leftarrow$  number of disks with desired artist and for which title is registered  
 S157 From K titles with desired artist, from  $\{(a-1) \times B + 1\}$ th to  $a \times B$ th are displayed as list  
 S158 Next page key pressed?

S161 From K titles with desired artist, from  $\{(a - 1) \times B + 1\}$ th to Kth are displayed as list

S162 Cancel key pressed?

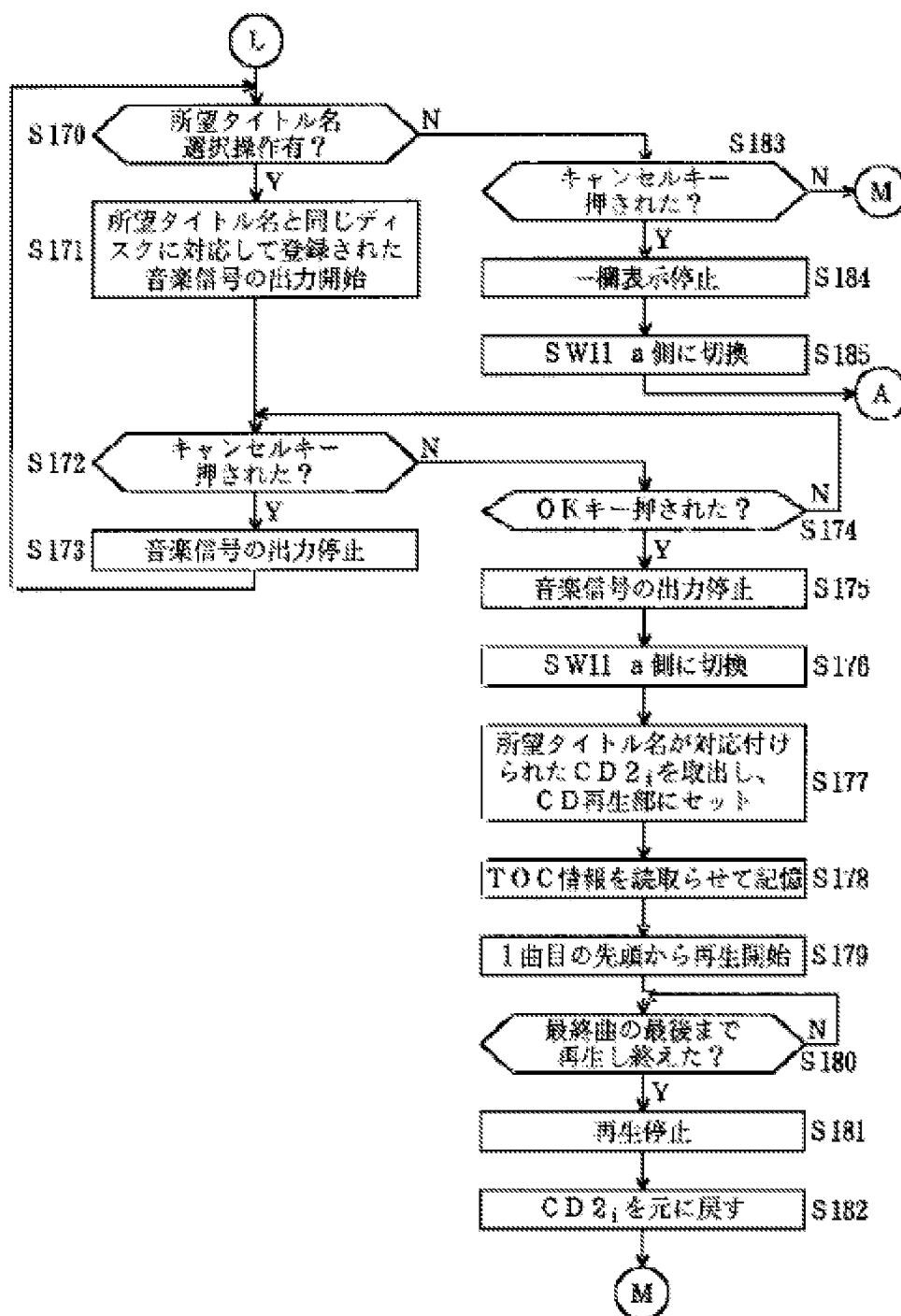


Figure 12

Key: S170 Has desired title been selected?  
S171 Start output of music signal registered corresponding to same disc as desired title  
S172 Cancel key pressed?  
S173 Stop output of music signal  
S174 OK key pressed?  
S175 Stop output of music signal  
S176 SW 11 switched to side a  
S177 CD 2<sub>i</sub> to which desired title is correlated is taken out and placed in CD playback unit  
S178 TOC information read and stored  
S179 Start playback from beginning of first song  
S180 Has playback reached end of last song?  
S181 Stop playback  
S182 CD 2<sub>i</sub> returned to original position  
S183 Cancel key pressed?  
S184 Stop list display  
S185 SW 11 switched to side a



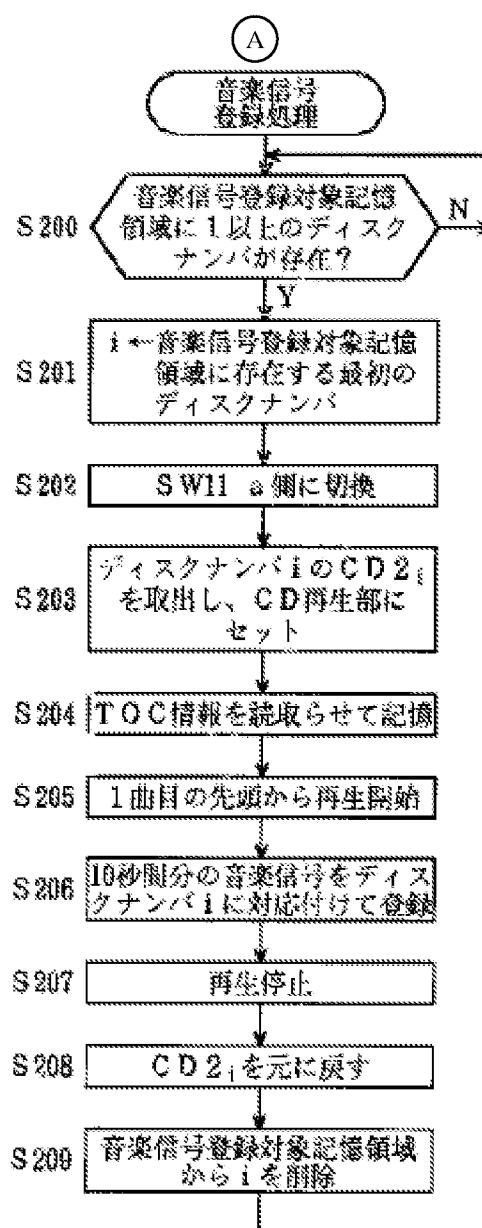


Figure 13

- Key:
- A Music signal registration processing
  - S200 Is there at least one disc number in memory region for music signal registration?
  - S201  $i \leftarrow$  first disc number in memory region for music signal registration
  - S202 SW 11 switched to side a
  - S203 CD 2<sub>i</sub>, which is the first disc number i, is taken out and placed in CD playback unit
  - S204 TOC information read and stored
  - S205 Start playback from beginning of first song
  - S206 10 sec of music signal registered correlated to disc number i
  - S207 Stop playback
  - S208 CD 2<sub>i</sub> returned to original position
  - S209 i is deleted from memory region for music signal registration

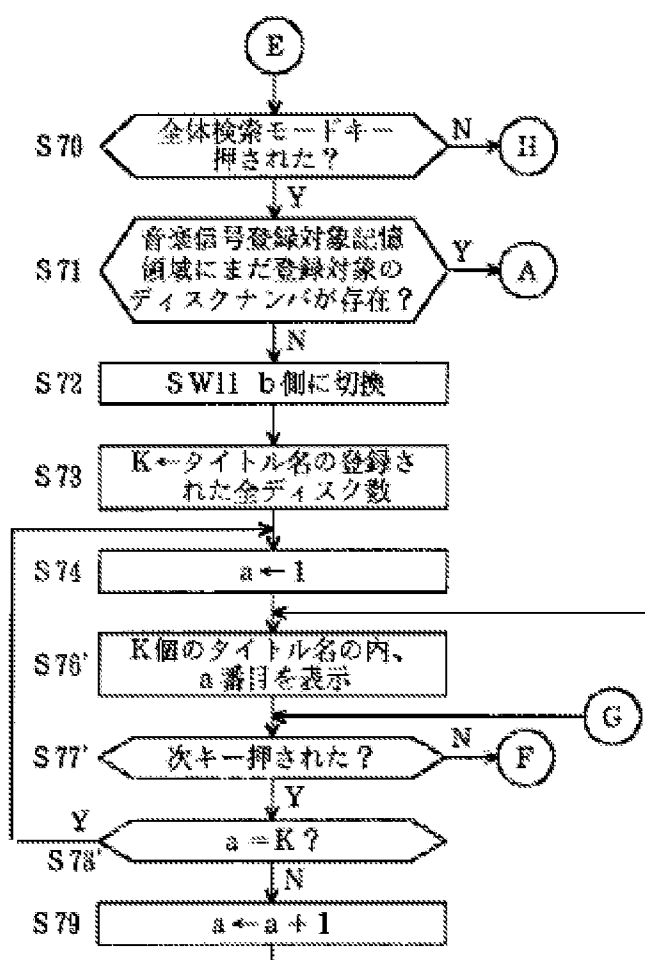


Figure 14

- Key: S70 Search all mode key pressed?  
 S71 Is a disc number to be registered still present in memory area for music signal registration?  
 S72 SW 11 switched to side b  
 S73  $K \leftarrow$  number of all discs for which title is registered  
 S76' Of K titles,  $a^{\text{th}}$  is displayed  
 S77' Next key pressed?

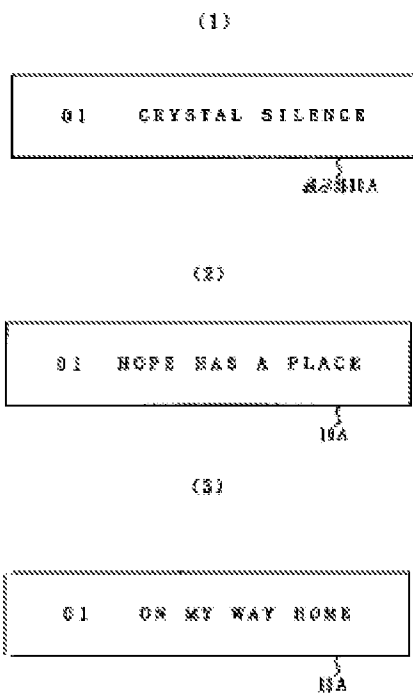


Figure 15

Key: 10A Display unit

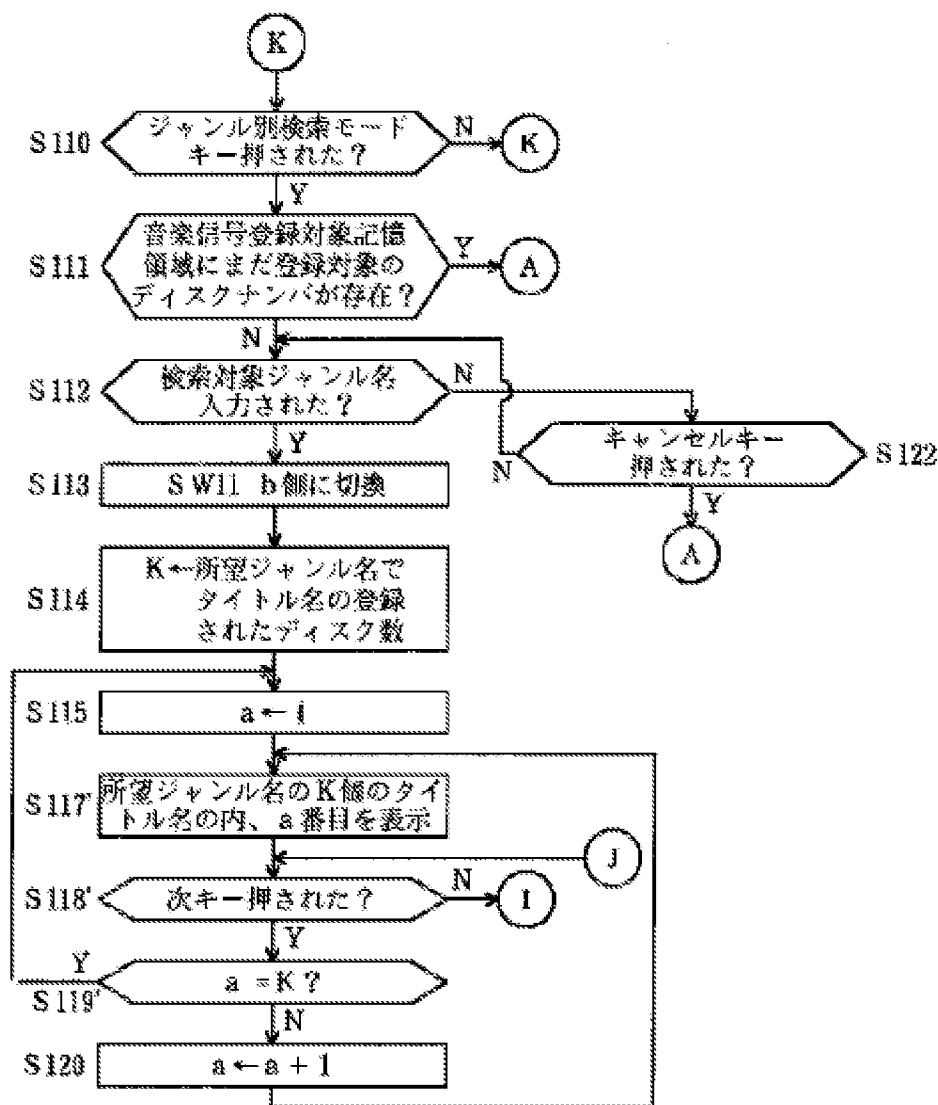


Figure 16

- Key: S110 Search by genre mode key pressed?  
 S111 Is a disc number to be registered still present in memory area for music signal registration  
 S112 Has searched genre been input?  
 S113 SW 11 switched to side b  
 S114  $K \leftarrow$  number of disks in desired genre and for which title is registered  
 S117' From K titles in desired genre,  $a^{\text{th}}$  is displayed  
 S118' Next key pressed?  
 S122 Cancel key pressed?

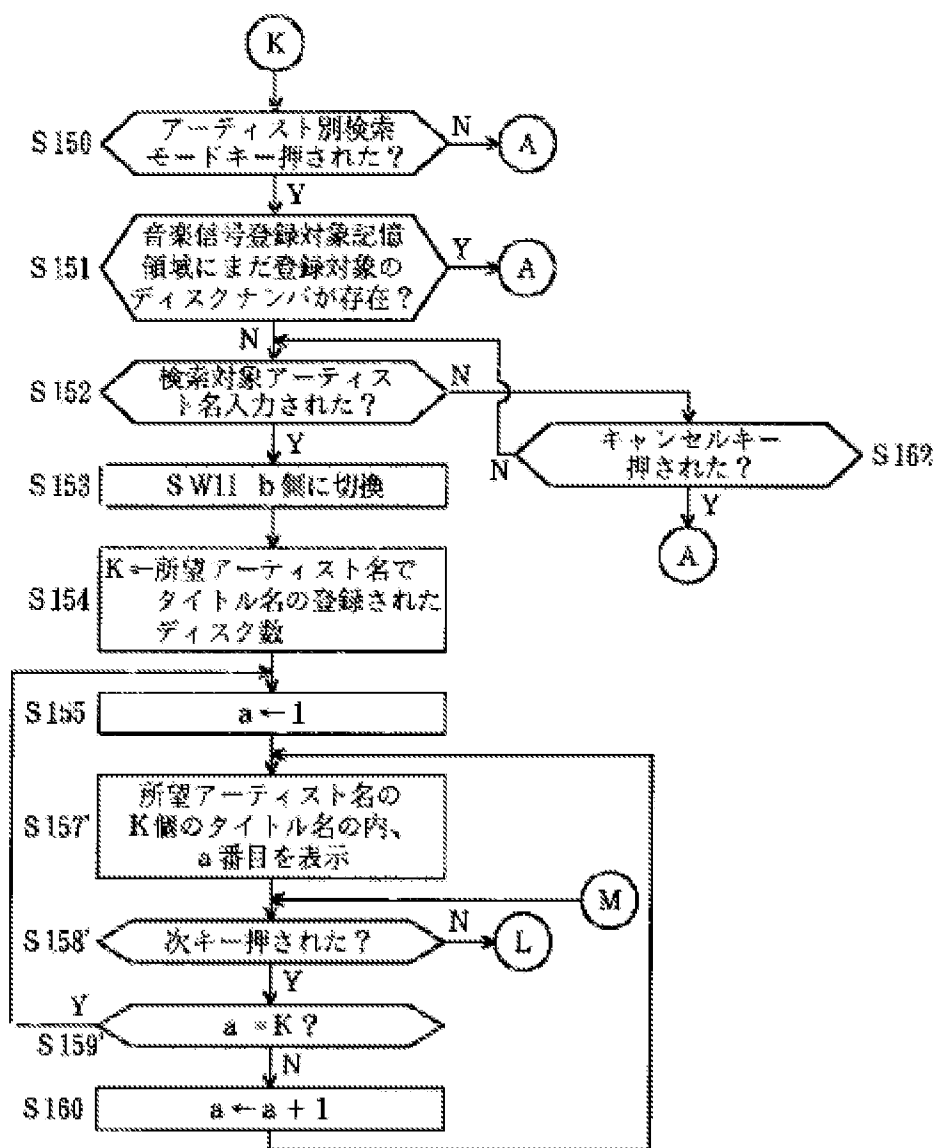


Figure 17

- Key: S150 Search by artist mode key pressed?  
 S151 Is a disc number to be registered still present in memory area for music signal registration?  
 S152 Has searched artist name been input?  
 S153 SW 11 switched to side b  
 S154  $K \leftarrow$  number of disks with desired artist and for which title is registered  
 S157' From K titles with desired artist,  $a^{\text{th}}$  is displayed  
 S158' Next page pressed?  
 S162 Cancel key pressed?

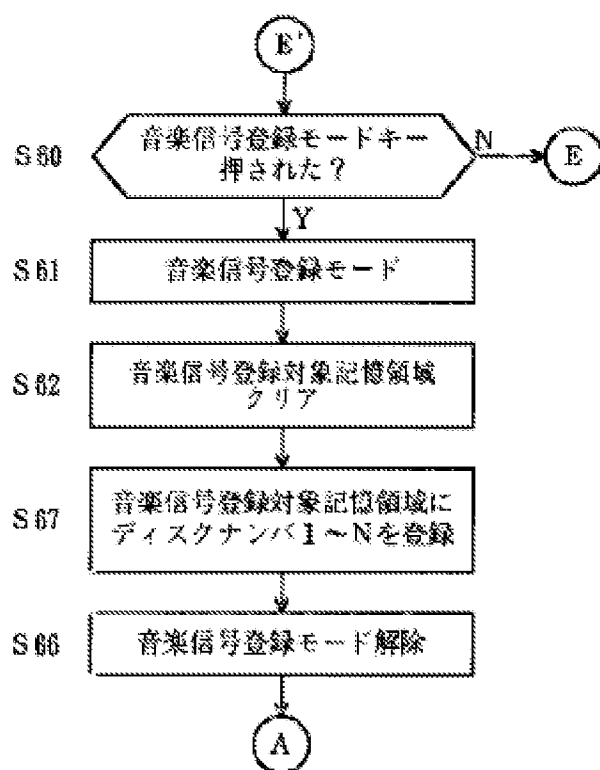


Figure 18

- Key:
- S60 Register music signal mode key pressed?
  - S61 Register music signal mode
  - S62 Clear memory area for music signal registration
  - S66 Register music signal mode canceled
  - S67 Disc number 1-N registered in memory area for music signal registration

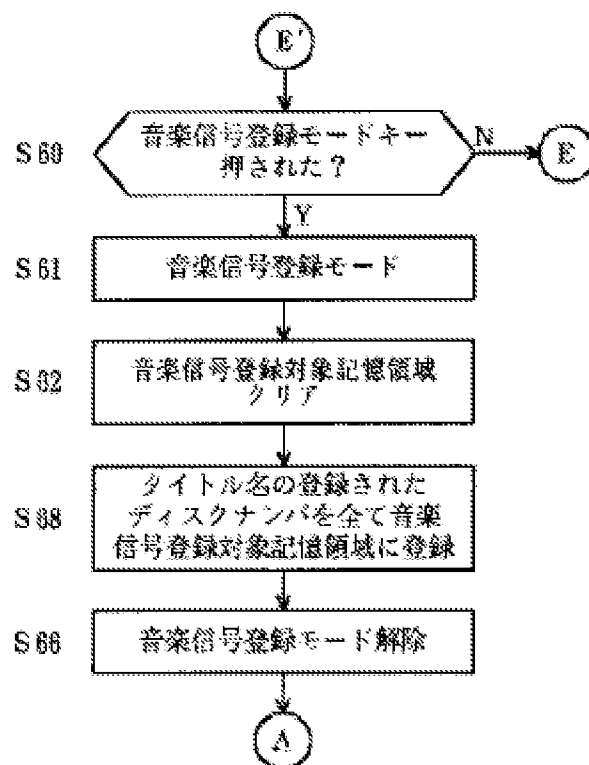


Figure 19

- Key:
- S60 Register music signal mode key pressed?
  - S61 Register music signal mode
  - S62 Clear memory area for music signal registration
  - S66 Register music signal mode canceled
  - S68 All disc numbers for which title is registered are registered in memory are for music signal registration

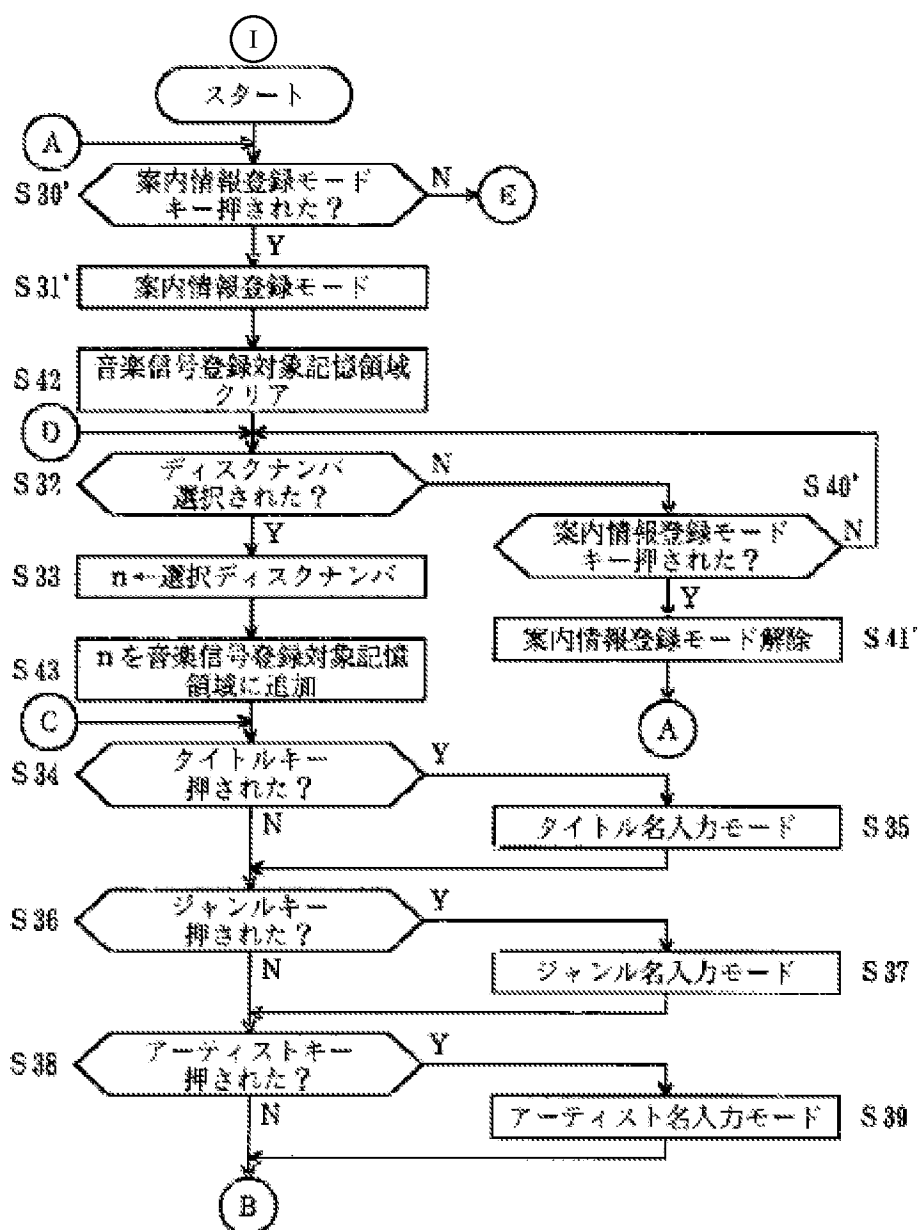


Figure 20

- Key: I      Start
- S30'    Register guide information mode key pressed?
- S31'    Register guide information mode
- S32    Disc number selected?
- S33     $n \leftarrow$  selected disk number
- S34    Title key pressed?
- S35    Title input mode
- S36    Genre key pressed?
- S37    Genre input mode
- S38    Artist key pressed?
- S39    Artist name input mode



- S40' Register guide information mode key pressed?  
 S41' Register guide information mode canceled  
 S42 Clear memory area for music signal registration  
 S43 n is added to the memory area for music signal registration

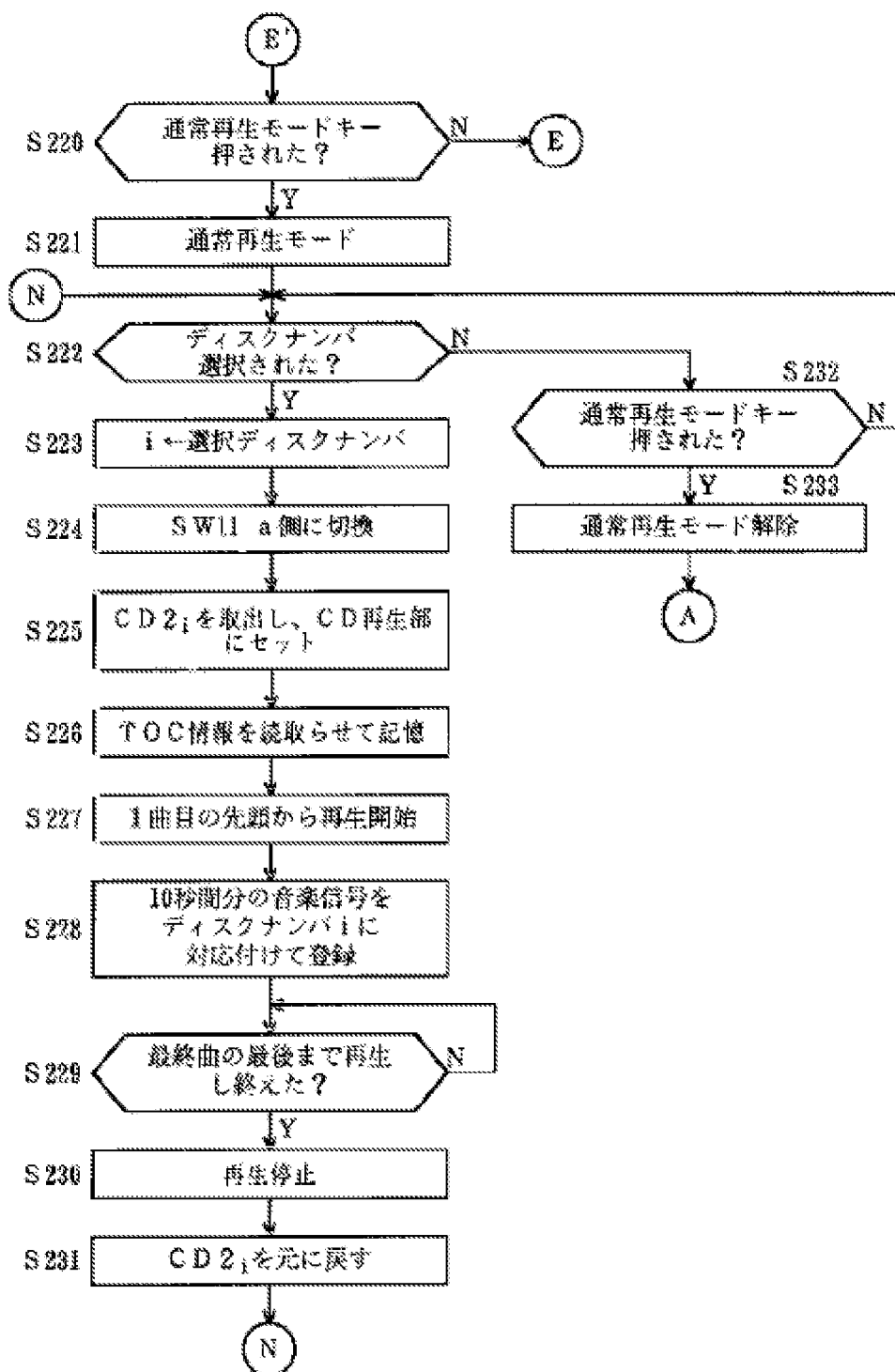


Figure 21

Key: S220 Normal play mode key pressed?  
S221 Normal play mode  
S222 Has a disc number been selected?  
S223  $i \leftarrow$  selected disc number  
S224 SW 11 switched to side a  
S225 CD 2<sub>i</sub> is taken out and placed in CD playback unit  
S226 TOC information read and stored  
S227 Start playback from beginning of first song  
S228 10 sec of music signal registered correlated to disc number i  
S229 Has playback reached end of last song?  
S230 Stop playback  
S231 CD 2<sub>i</sub> returned to original position  
S232 Normal play mode key pressed?  
S233 Normal play mode canceled

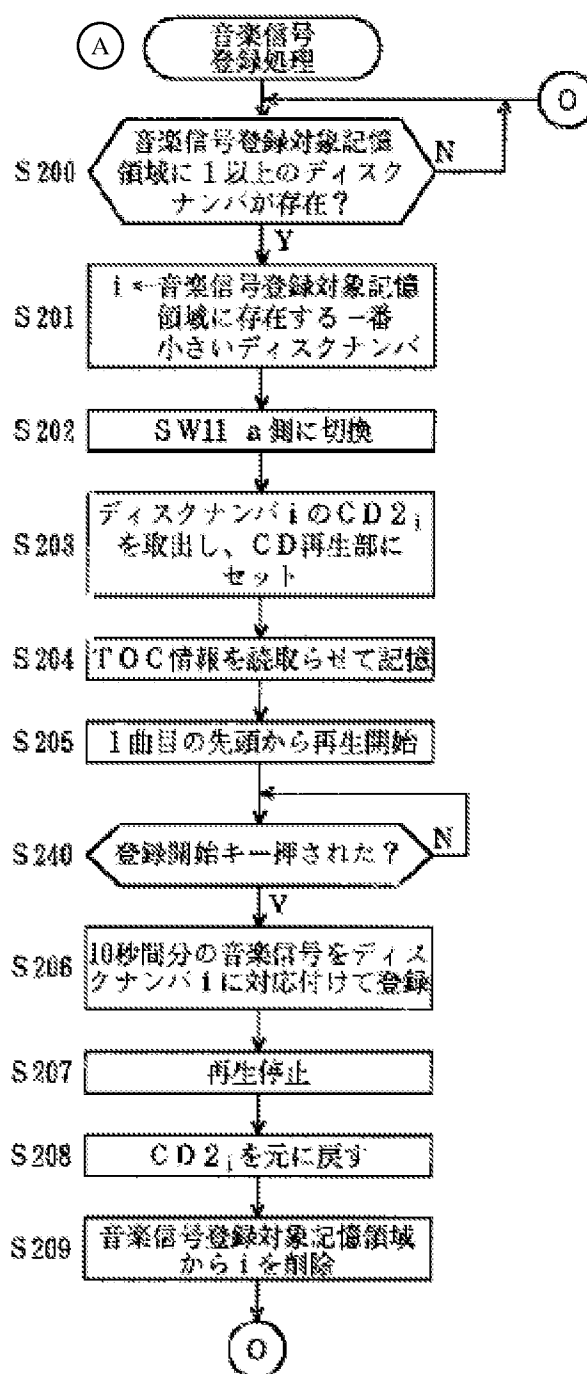


Figure 22

- Key:
- A Music signal registration processing
  - S200 Is at least 1 disc number present in memory area for music signal registration
  - S201  $i \leftarrow$  Disc number with smallest number present in memory area for music signal registration
  - S202 SW 11 switched to side a

- S203 CD  $2_i$ , which is disc number  $i$ , is taken out and placed in CD playback unit
- S204 TOC information read and stored
- S205 Start playback from beginning of first song
- S206 10 sec of music signal registered correlated to disc number  $i$
- S207 Stop playback
- S208 CD  $2_i$  returned to original position
- S209  $i$  is deleted from memory region for music signal registration
- S240 Registration start key pressed?

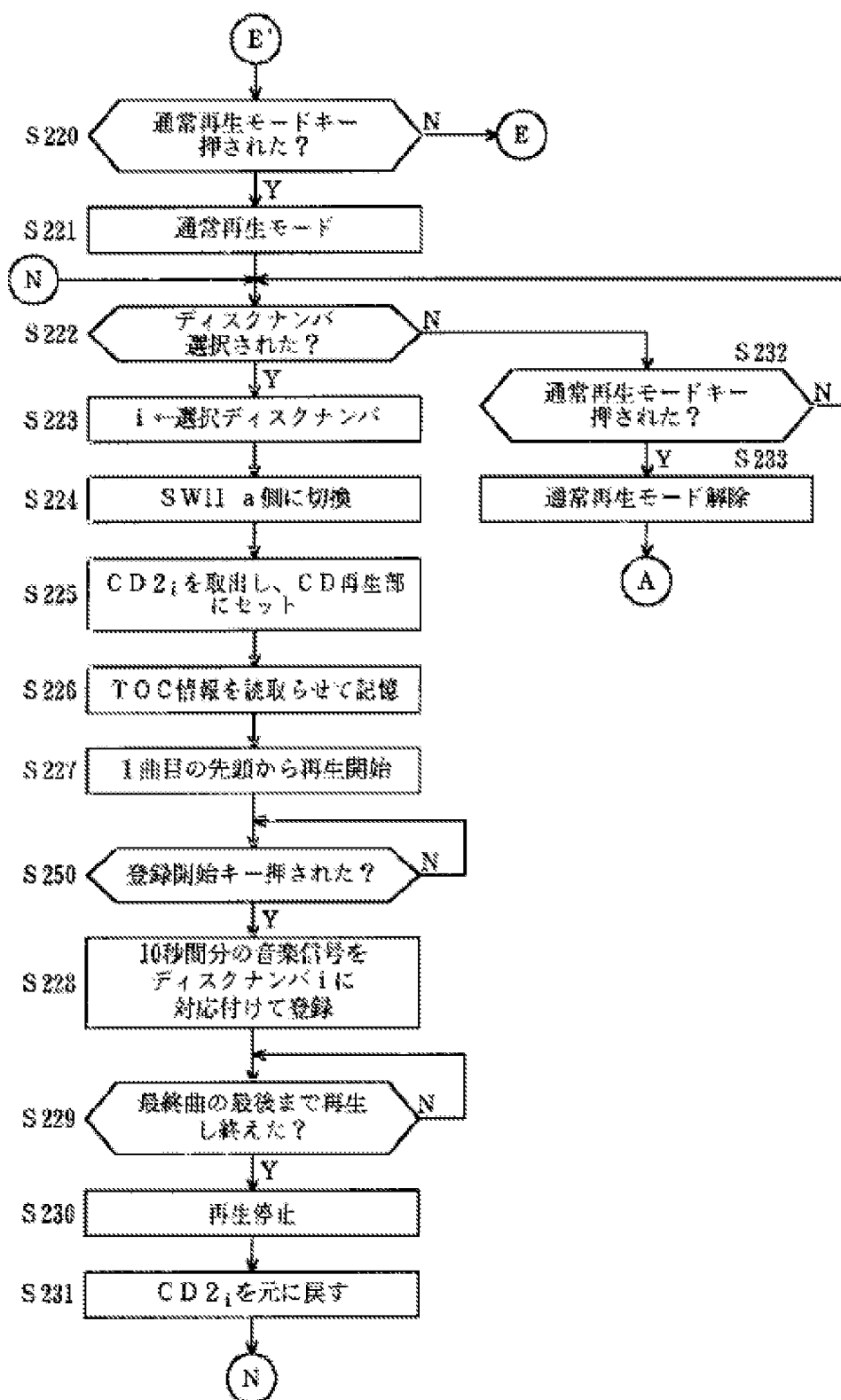


Figure 23

- Key: S220 Normal play mode key pressed?  
 S221 Normal play mode  
 S222 Has a disc number been selected?  
 S223  $i \leftarrow$  selected disc number  
 S224 SW 11 switched to side a  
 S225 CD  $2_i$  is taken out and placed in CD playback unit  
 S226 TOC information read and stored  
 S227 Start playback from beginning of first song  
 S228 10 sec of music signal registered correlated to disc number  $i$   
 S229 Has playback reached end of last song?  
 S230 Stop playback  
 S231 CD  $2_i$  returned to original position  
 S232 Normal play mode key pressed?  
 S233 Normal play mode canceled  
 S250 Registration start key pressed?

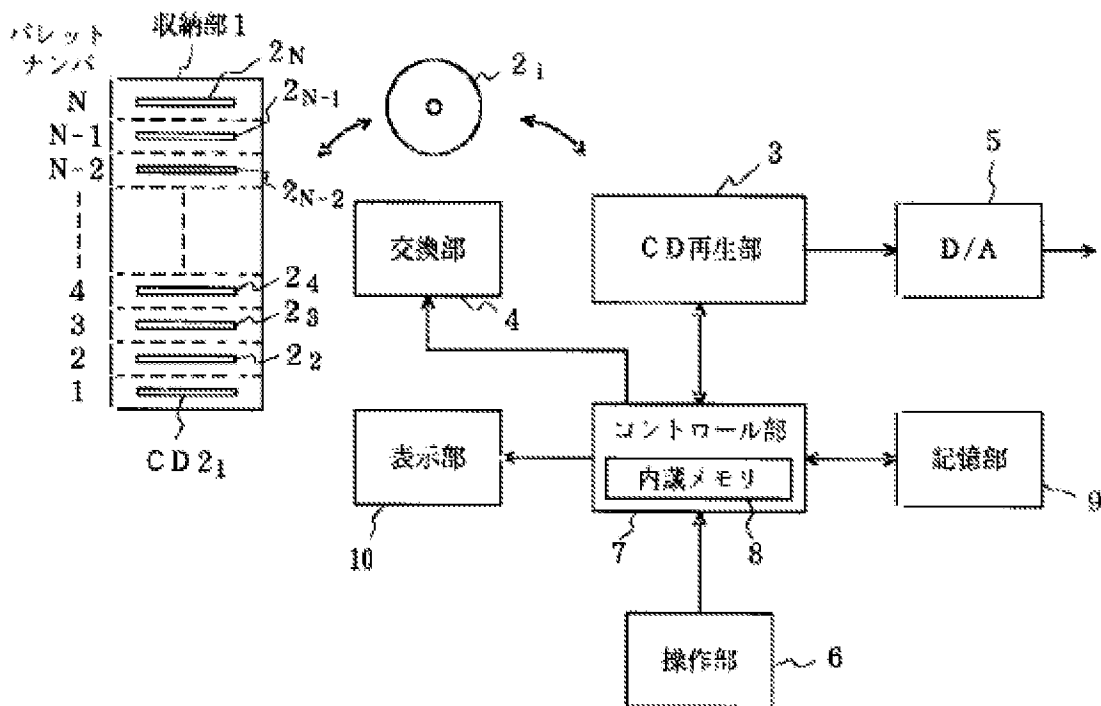


Figure 24

- Key: N Disc number  
 1 Holding unit  
 3 CD playback unit  
 4 Exchange unit  
 6 Operating unit  
 7 Control unit  
 8 Built-in memory  
 9 Memory unit  
 10 Display unit

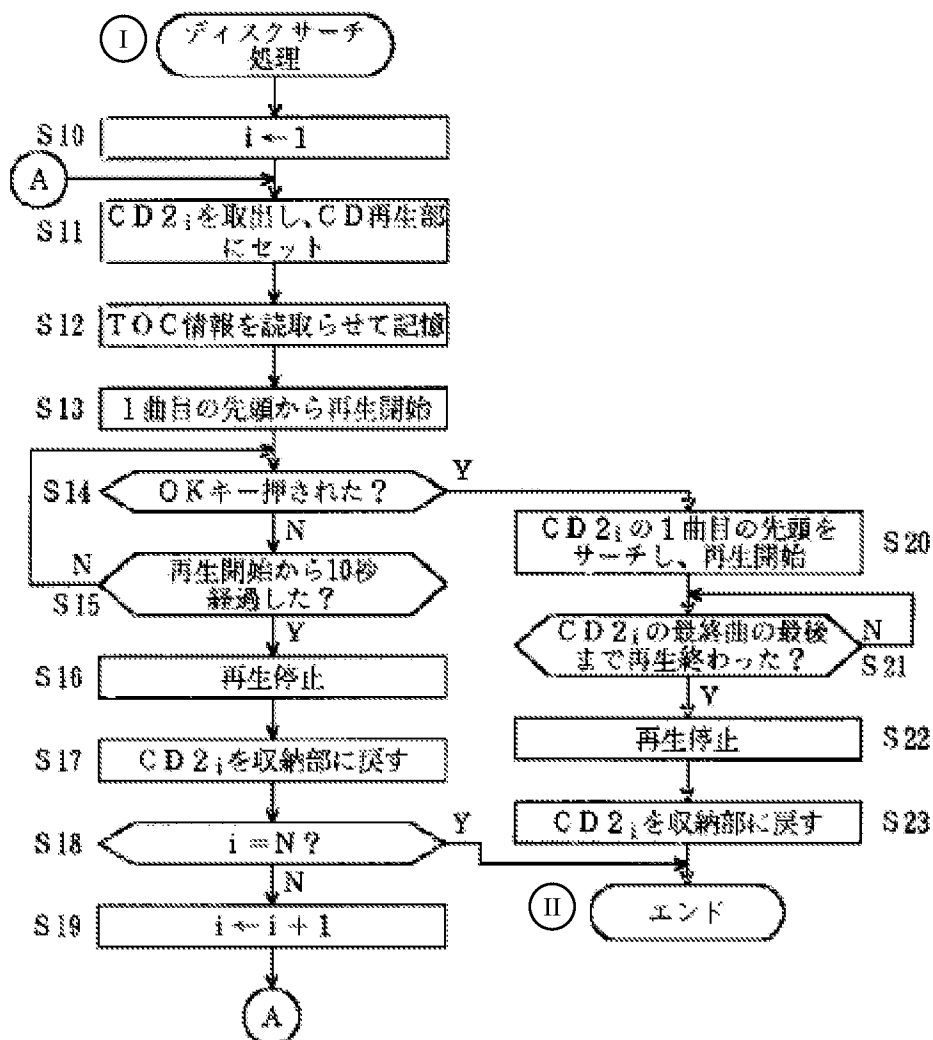


Figure 25

Key:	I	Start
	II	End
	S11	CD 2 <sub>i</sub> is taken out and placed in CD playback unit
	S12	TOC information is read and stored
	S13	Start playback from beginning of first song
	S14	OK key pressed?
	S15	Has 10 sec from start of playback elapsed?
	S16	Stop playback
	S17	CD 2 <sub>i</sub> is returned to holding unit
	S20	Beginning of first song on CD 2 <sub>i</sub> is searched for, playback is started
	S21	Has playback reached end of last song on CD 2 <sub>i</sub> ?
	S22	Stop playback
	S23	CD 2 <sub>i</sub> is returned to holding unit

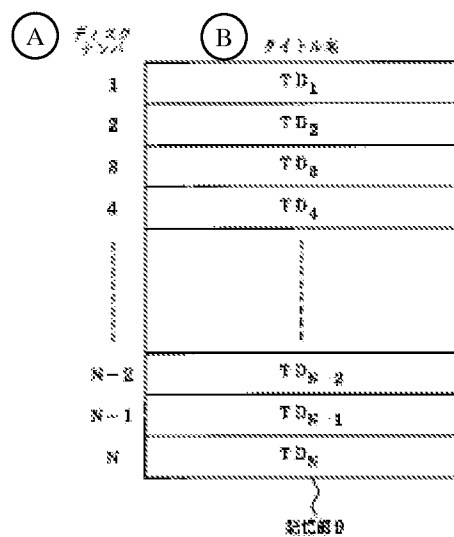


Figure 26

Key: A     Disc number  
       B     Title  
       9     Memory unit

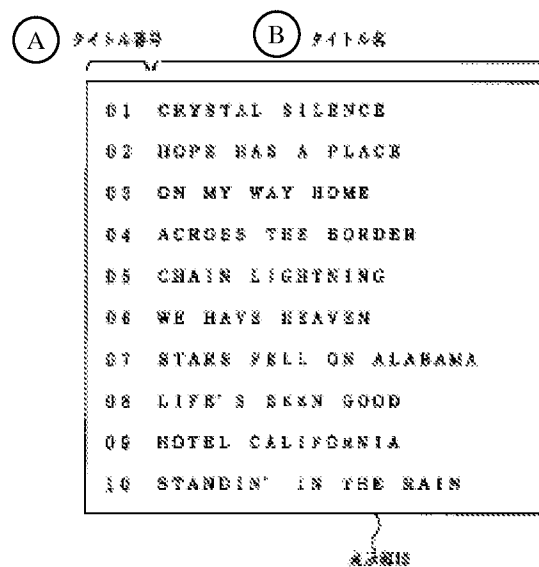


Figure 27

Key: A     Title number  
       B     Title  
       10    Display unit